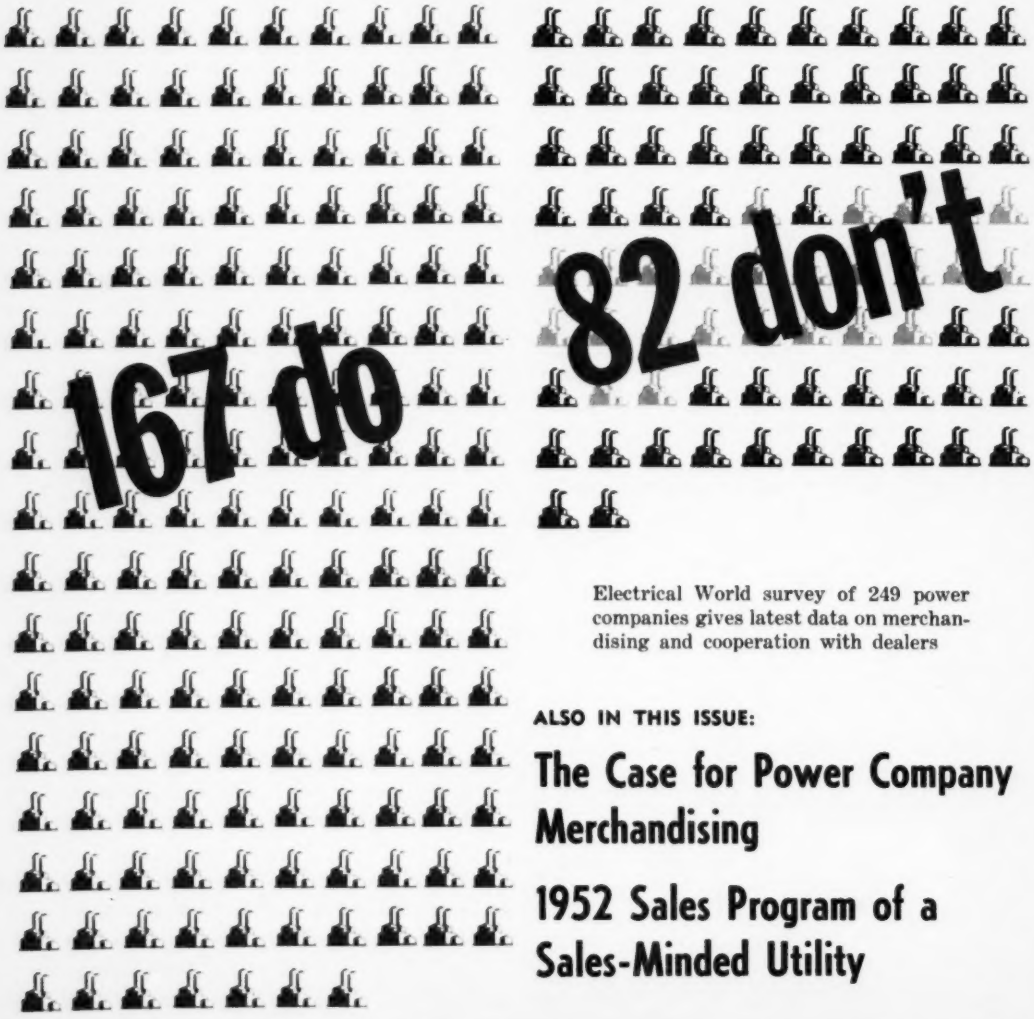
MARCH 24, 1952

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

How Many Power Companies Merchandise?



Electrical World survey of 249 power companies gives latest data on merchandising and cooperation with dealers

ALSO IN THIS ISSUE:

The Case for Power Company Merchandising

1952 Sales Program of a Sales-Minded Utility

Low-Cost 5/8% Step Regulator Line Distribution Extended

Time-tested JFR regulators can now be used on any feeder

THE EXTENSION of the Allis-Chalmers JFR 5/8% step voltage regulator line to cover five new ratings means that the initial cost of regulation has been reduced for many more feeders. Now you can get time-tested JFR's in the following ratings: 100 amps rated 7620 volts; 50 and 100 amps rated 5000 volts; and 100 and 200 amps rated 2500 volts.

The low price tag on Allis-Chalmers JFR 5/8% step regulator line means that the advantages of voltage regulation can now be brought to marginal lines where equipment costs were too high before. And even though the price tag is low, there's no reduction in quality with the JFR. You get all the advantages of Allis-Chalmers 5/8% step voltage regulation: 5/8% steps, ± 1 volt band, 20% range of regulation, close average voltage maintained by voltage integrator, life long contacts, tap changing and drive mechanism with balanced spring action to eliminate shock, and unit construction for easier maintenance.

Get the complete story on how the Allis-Chalmers JFR 5/8% step voltage regulator line can cut regulation costs for you. Call your nearest Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3622

RATINGS NOW AVAILABLE

7620 volts	5000 volts	2500 volts
15 amp	50 amp	100 amp
50 amp	100 amp	200 amp
100 amp		

ALLIS-CHALMERS

Originators of 5/8% Step Regulators

THE OTHER FELLOW'S PLANT

Everybody and his brother are building power plants in the scramble to keep safely ahead of the leaping loads. Not since we first started getting ready for a war with Hitler and Hirohito has there been so much scratching of craniums and sharpening of pencils. Naturally everybody and his brother are wanting to know what decisions the others are making in connection with their new capacity.

Electrical World modestly believes it coined a new technique for passing around the principles adopted for the initial new wave of plants when it published the essential details of some 81 stations in a compilation in the May 8, 1950 issue.

In the April 7, 1952 issue they will find similar information about 92 still newer plants. This batch of stations amounts to well over half the total capacity being talked about for the period up to 1955. The summary gives the salient features easily in qualitative form. Anyone asking a designer what salient features he was incorporating in his latest plant might easily find himself asking 186 questions to elicit the information. That happens to be the number answered in the April 7 Electrical World.

DON'T CALL THE PLUMBER

When a shoe begins to wear through in the sole, the wearer may insert some paper or a piece of cardboard to extend the life with a negligible loss of capacity. Unfortunately the job isn't so simple when it comes to patching holes in a penstock which has become badly corroded. One way to repair penstocks has been to open up the steel pipes and apply a coal tar enamel. Another is to replace the penstocks entirely.

However, neither of these two solutions struck the engineers of California Electric Power Co as being the cheapest or most satisfactory way of doing the job. After talking with several water utilities, they decided to try a cement mortar lining. Enlisting the aid of a contractor who had an ingenious machine for applying the mortar lining, CEPCo engineers not only stopped corrosion and strengthened weakened sections of their penstocks, but also they improved the hydraulic characteristics at a price of about $4 per foot.

Be sure to read "Mortar Lining Extends Pipeline Life and Restores Original Capacity" in a coming issue.

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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for longer-lived paper insulated power cables,

ALWAYS USE THIS

OKOMETAL OF REDUCED THICKNESS
PLUS OKOSHEATH PROTECTIVE COVERING

PLUS THIS

GARRISON JOINT (Tapered reinforcement)*
*U. S. Pat. 2,571,857

Recognizing that sheath failures in underground systems take place either along the cable run or immediately adjacent to the joint, research engineers at Okonite-Callender have developed a "system" solution that, first, provides an improved cable design and, second, a superior jointing method.

1. Okonite-Callender's cable design, comprising a sheath of Okometal of reduced thickness plus Okosheath Protective Covering, more than doubles the life expectancy of paper-insulated cables. Because it eliminates sheath corrosion, protects the metal sheath from mechanical injury and doubles sheath resistance to fatigue failure caused by cyclic bending, the Okometal-Okosheath composite construction has become an important solution to premature lead sheath cable failure.
2. To provide complete protection from failures caused by concentration of stresses in the lead sheath adjacent to the joint during cyclic bending, Okonite-Callender has developed the Garrison Joint. This joint design provides a simple method for strengthening the sheath next to the joint, since it distributes stresses along the cable, thus providing a greatly increased area of resistance, with appreciably reduced cracking. (The Garrison Joint can be used effectively with any type of lead-sheathed cable.)

For the ultimate in proven insulated cable life, therefore, it is important first, to specify Okometal-Okosheath construction, and second, to augment the long life of this cable with the Garrison Joint.

FURTHER INFORMATION for installation of the joint is given in Bulletin EW-1051; Bulletin EW-1047A discusses the Okometal-Okosheath construction. They're yours for the asking. The Okonite Company, Passaic, N. J.

OKONITE-CALLENDER

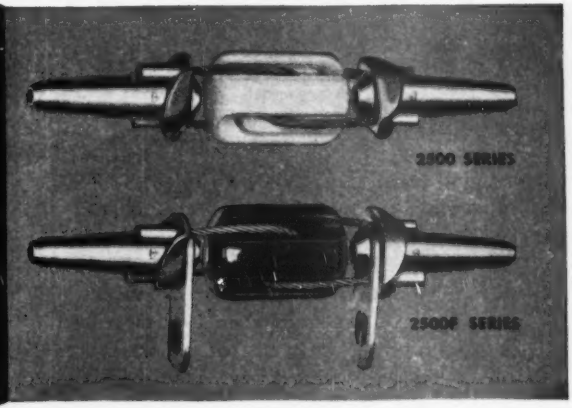
for the largest number of line applications at the lowest possible cost...

USE

Electroline

Insulating
Automatic
Line Splice

SECTIONALIZERS



The Electroline Sectionalizers are assemblies that will function in service as most convenient, reliable and yet low cost interrupting devices. Series 2500-F and 2600 provide for paralleling with a fuse element for further protection when sectionalizing. The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor for which they are adapted.

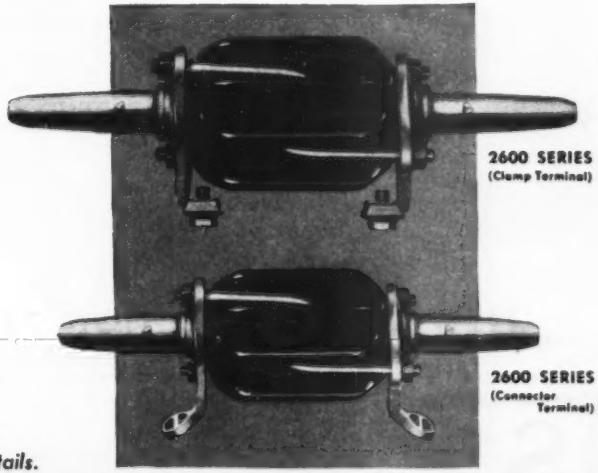
These Insulating Automatic Line Splice Sectionalizers are ideal for:

Installing Regulating Equipment,
simplifies cutting-in disconnecting points, fuses, voltage regulators and series capacitors;

Restoring Service,
providing points to test for trouble;

Sectionalizing Networks,
to readily isolate and test the area in trouble;

Series Street Lighting,
simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.



Send for Bulletins containing complete details.

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E
INABILITY TO PRODUCE

Electroline Company

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In Canada: POWERLITE DEVICES, LTD., TORONTO

NOW!
Cut Engineering Time and Effort
In Group-Operated Switch Application
WITH "READY-MADE"
Standard Mounting Arrangements and . . .

The high voltage switch user has been —in the past—subjected to a series of inconveniences when he has ordered a group-operated switch. Special erection drawings were required; there was usually a delay in preparing these drawings, in obtaining customer approval, and sometimes in manufacture while special operating parts were fabricated. To overcome these inconveniences, a series of "ready-made" Standard Mounting Arrangements, covering the majority of configurations used in line and station construction, have been developed for each group-operated Alduti Interrupter Switch.

What Standard Mounting Arrangements Mean to You

Switches may now be ordered immediately, and you can at once complete your line or station layout, since no "special" drawings are required to adapt the switches. Also shipping time is radically reduced, since there is no delay for engineering, or for customer approval.

Standard Mounting Arrangements Charted

To further simplify the engineering process a Selector Chart, shown on the facing page, pictures the available Standard Mounting Arrangements, each designated by an "ED" number. Each ED number on the Selector Chart identifies a printed standard erection drawing on which is given in detail, all the information needed to apply and install the selected switch together with its operating mechanism.

Thus you can have in your file — visually indexed by the Selector Chart — all of the engineering data needed to select, specify, and install any group-operated Alduti Interrupter Switch in a wide variety of arrangements to suit almost any mounting requirement.

Complete information, including the Selector Chart, is contained in this

NEW CATALOG SECTION 760

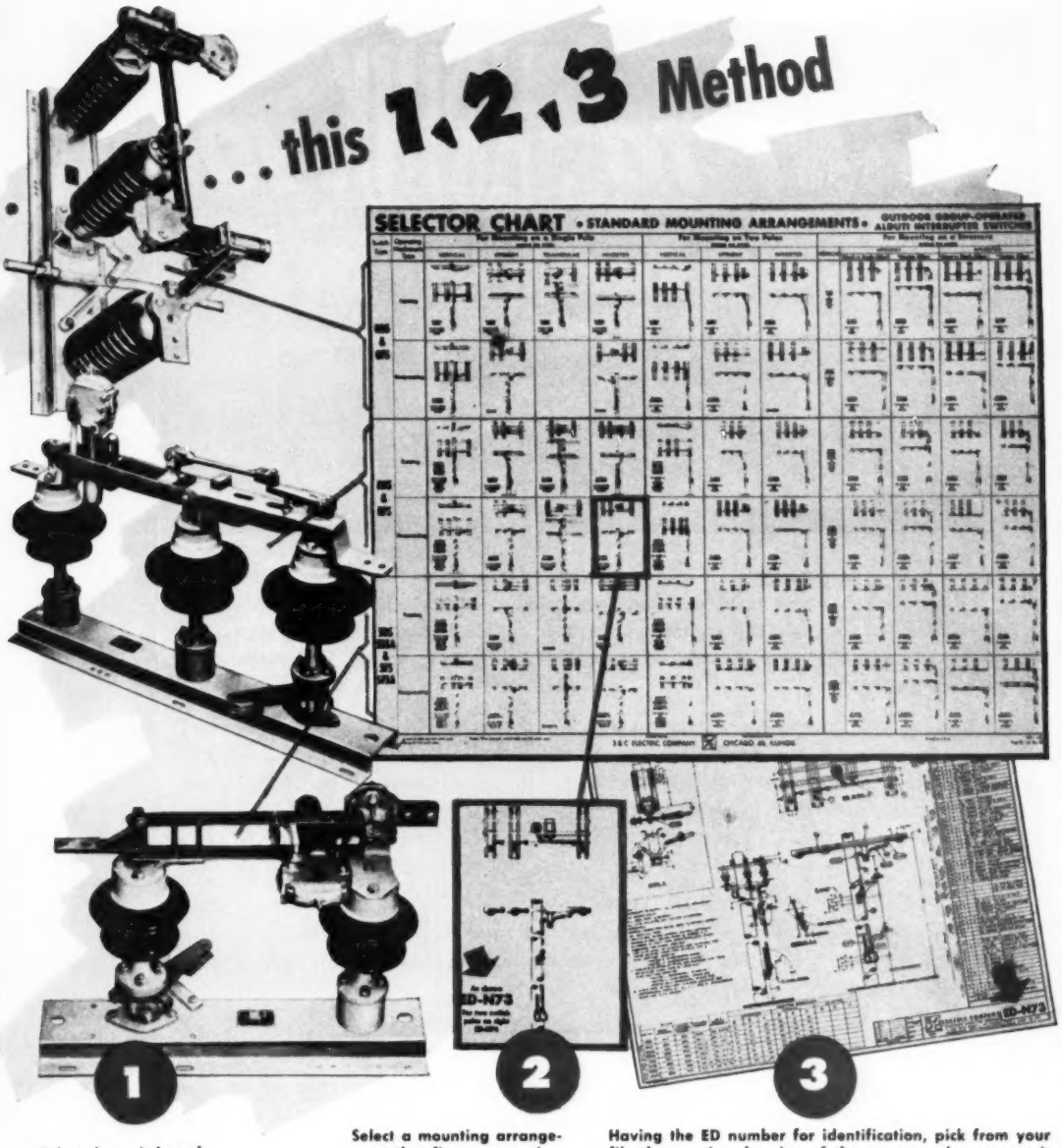
Write for your copy, or contact your S & C representative today.

S&C ELECTRIC COMPANY

4421 RAVENSWOOD AVENUE
CHICAGO 40, ILLINOIS, U. S. A.
Formerly Schweitzer & Conrad, Inc.

IN CANADA, Powerlite DEVICES, LIMITED, TORONTO

. . . this 1, 2, 3 Method



Select the switch and specify by catalog number.

Select a mounting arrangement that fits your requirement, and specify by "ED" number.

Having the ED number for identification, pick from your file the erection drawing of the same number, or get it from your S & C representative. The erection drawing gives all the information needed to install the switch.

The ALDUTI INTERRUPTER SWITCH is a high voltage circuit interrupter for outdoor, indoor or metal-clad service providing a visible isolating air gap. In appearance, simplicity of construction, and mechanics of disconnecting it resembles the conventional air break switch. In scope of current interruption — fault currents excepted — and in behavior during current interruption it is similar to a circuit breaker. In the economics of application it stands alone.

It interrupts — without arcing — line and cable charging currents, capacitor charging currents, magnetizing currents, and load currents up to 600 amperes.

Filling the gap between air-break switches and circuit breakers, the interrupter switch is now used in a variety of utility and industrial applications — sectionalizing, transformer primaries, transformer secondaries, preferred-emergency throw-over, power centers, unit substations, bus transfer, and capacitor bank switching.

Moreover, the no-external-arc performance has permitted physical applications of the Alduti Interrupter Switch usually *not* practicable with conventional air switches, i.e., vertically mounted, mounted on close phase spacings, and metal-clad.

WANT TO "SHRINK" YOUR ALUMINUM CABLES?

It is easy to do if you know how. Here's how. To operate at the same temperature, your insulated aluminum cable would have larger size conductors to compensate for the reduced conductivity of aluminum. It follows then that your conduits, fittings and connectors would all have to be larger than for copper.

But if you buy a cable having approximately the same size aluminum conductor that you would ordinarily buy if you were using copper, the aluminum cable will run considerably hotter than a copper cable would under the same load. So instead of using conventional insulations, which are seldom rated more than 140 F. (60 C.), specify Simplex-Anhydrex XX insulation. This will help overcome the heat problem, where voltage drop will permit, because Anhydrex XX is rated at 176 F. (80 C.).

Simplex-Anhydrex XX insulation will operate at temperatures up to 176 F. (80 C.) in either wet or dry locations at voltages up to 17,000. That's how you shrink aluminum conductors.

If you must use aluminum because of the copper shortage, let our engineers help you with your problem.

We would be more than happy to give you the latest specification data on Simplex-Anhydrex XX insulation. Simply send your request to the address shown below.

Simplex-Anhydrex XX is a product of Simplex Research.

SIMPLEX-ANHYDREX XX

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

Current and potential transformers are combined in one unit for single or three-phase systems, 2.5 to 161 kv, in Westinghouse Type MP Metering Outfits. Enclosed in pressure-tight steel cases, with cover-mounted bushings and cover-suspended elements, they meet highest accuracy standards.

Because he handles the most complete line in the industry, your Westinghouse representative has specific answers for all your instrument transformer problems. Call him today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

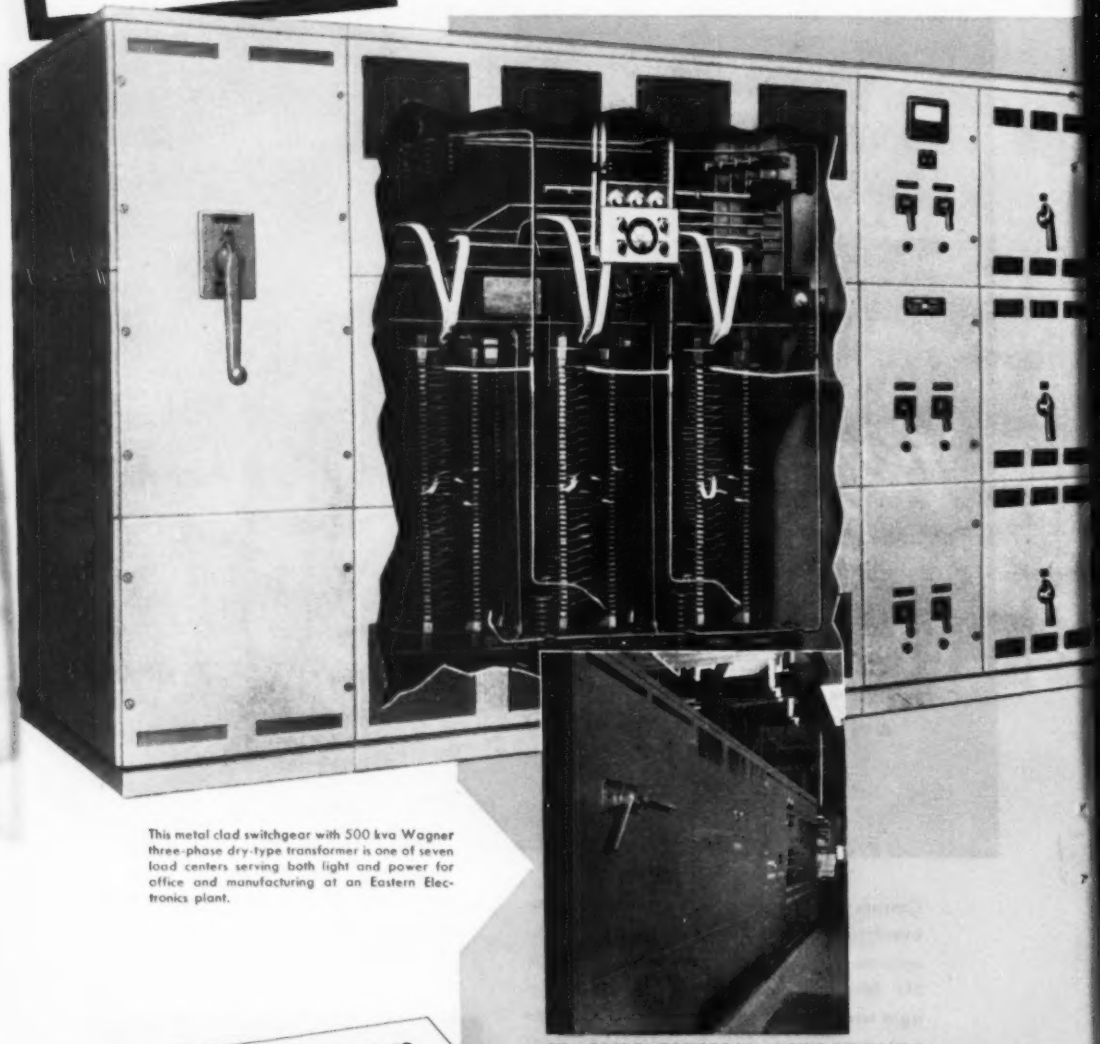
J-70618

INSTRUMENT
TRANSFORMERS

Wagner

TRANSFORMERS

...the choice of leaders in industry



This metal clad switchgear with 500 kva Wagner three-phase dry-type transformer is one of seven load centers serving both light and power for office and manufacturing at an Eastern Electronics plant.

WAGNER ELECTRIC CORPORATION

6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

® Wagner Electric Corporation EST. 1891

T51-9

always specify Wagner
UNIT SUBSTATION TRANSFORMERS
for dependable load-center power distribution

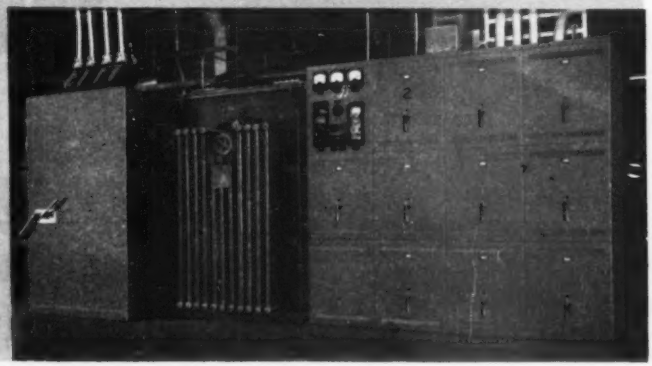
The importance of the transformers in your plant power distribution system cannot be over-emphasized. If a switch or a circuit breaker fails, only a part of the system is affected—but if the *transformer* fails, the entire system is dead.

Wagner Unit Substation Transformers, both dry-type and liquid-filled, assure a continuous, dependable flow of power. They are carefully designed to meet your distribution requirements.

Wagner three-phase dry-type load-center transformers are built in ratings through 2000 kva in the 15-kv class and below. Transformer and incoming line section are housed in compact factory-matched enclosures, designed for direct connection to matching secondary switchgear to form a closely coupled unit substation that is streamlined in appearance and affords ready accessibility. Complete enclosure of all equipment assures safety against contact with live parts.

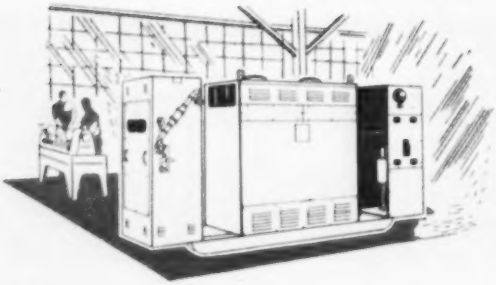
Wagner Dry-Type Unit Substation Transformers are for indoor installation in dry, clean, well ventilated locations. Because of their relatively light weight they can be used in multi-story buildings. Wagner Liquid-Filled Unit Substation Transformers are available for indoor or outdoor installation.

Bulletins TU-56 and TU-13 give full information on Wagner Dry-Type and Liquid-Filled Substation Transformers. Write for your copies. Wagner-trained field engineers will be glad to help you solve your load-center problems. Consult the nearest of our 32 Branch offices. There's no obligation.

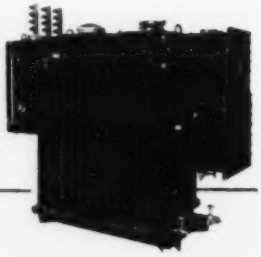


Oil filled and non-inflammable liquid-filled (Noflamol) transformers are available with various types of entrances and controls for high-voltage circuits, and with throats on the secondary side, in ratings up to 2000 kva.

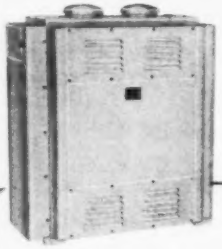
custom-built transformers



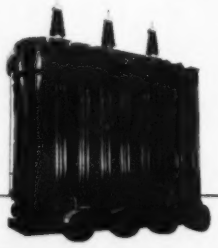
When custom design is a factor . . .



Askarel filled subway type network transformer, 500 KVA, 12460 to 216Y/125 volts, 3-phase, 60-cycle, complete with high voltage disconnect and grounding switch, low voltage network protector, and electrical interlocks.



Dry type air-cooled, load center transformer, 225 KVA, 3-phase, 60-cycle, 2400 to 120/208Y volts. Gang operated oil-fused cutouts are included with operating handle which is accessible through door in end of cabinet.



Power transformer, 10,000/12,500 KVA, 3-phase, 50-cycle, voltage 69,000Y to 13,200Y, with tertiary winding of 3500 KVA, air blast equipment for supplemental rating, low voltage terminal chamber and wheels.

TRANSFORMERS are the only product The Standard Transformer Company builds . . . the most important part of the load center. You thus have complete freedom in your choice of accessory equipment.

Specify the type and make of switchgear you prefer . . . STANDARD will quickly produce a complete, well-integrated unit, exactly designed to the proper dimensions and arranged according to your requirements.

As STANDARD has specialized in transformer design and application for more than 30 years, unusual assemblies are usual with us. You write your own ticket.

Whether unit installations are required for indoor, outdoor or underground, STANDARD will meet your most exacting requirements and include accessory equipment made by the supplier you prefer.

Write today for specific information.

Everything points to . .

WRITE FOR BULLETIN CL-50

See and read about actual transformer installation on the job around the world . . . evidence that your confidence in STANDARD is well placed.

Standard

THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

Above: Recessed Troffer with GRATELITE

Below: New Futurliter with GRATELITE

Here's a new development in lighting: A plastic louvre with 45° x 45° cut off for efficient vertical illumination and low brightness diffusion at high angles.

GRATELITE is the FIRST plastic louvre made in sizes up to 48″ long. It provides excellent shielding with maximum light output. With GRATELITE, fixtures and surroundings are more attractive. Strong, lightweight GRATELITES are durable; won't warp or discolor. Easy to clean. Easy to install on single fixtures or complete ceilings. Available in opaque or transparent densities.

For complete information, contact your nearest GUTH resident engineer today.

THE EDWIN F. GUTH COMPANY / ST. LOUIS 3, MO.

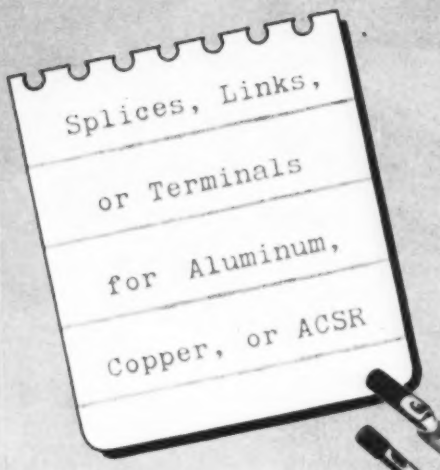
1952 Guth

hydraulic power for quick, economical connections anywhere

FOOT OPERATED HYPRESS*

BURNDY

lightest tools



HYDENT CONNECTORS...

Listed by Underwriters' Laboratories in all sizes — #22 through 2,000 Mcm.

Recommended for hydraulic tooling from #9 through 2,000 Mcm.

HYLUGS and HYLINKS — One piece, pure copper, tubular construction. Indent on any side of barrel. Can't split. No intermediate contact surfaces, current carried by entire cross-section. Plated to resist corrosion. Ask for Catalog Y538.

HYSPLICE — Full tension and loop. Multiple indents compress conductor with firm, uniform grip... develop holding power greater than rated minimum breaking strength of conductor. Ask for Catalog HS518.

HYCRAB — Insulated multiple connector. Most economical method of joining cables in underground networks. Ask for Catalog Z478.

*Air or electrical driven units can replace foot pump where required

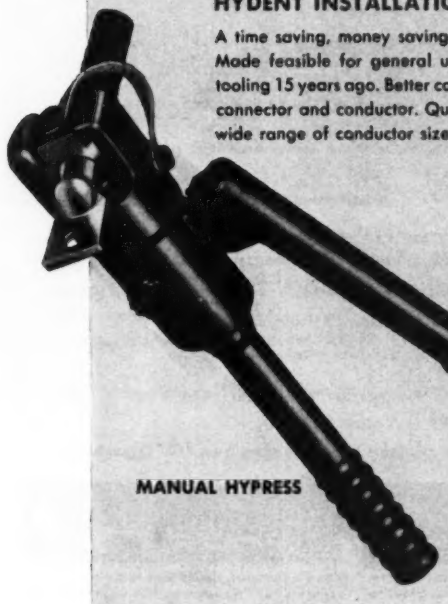
electrical connectors and installation tools by...

HYPRESS

per ton of delivered force

HYDENT INSTALLATION...

A time saving, money saving method of making permanent, uniform connections faster. Made feasible for general use when Burndy developed portable hydraulic installation tooling 15 years ago. Better connections assured by intimate, high pressure contact between connector and conductor. Quickly interchangeable dies permit each tool to be used over wide range of conductor sizes.



MANUAL HYPRESS

OVERHEAD and UNDERGROUND "A 9-lb. tool with a 9-ton bite" makes the manual Hypress the lineman's favorite. Rotating head through 90°. Neoprene insulated for hot line operation at secondary distribution voltages —helps protect against shorts at higher voltages.

For maneuverability in cramped quarters—for indenting pressures to 80,000 lbs. and for wire or cable through 2,000 Mcm—the foot operated Hypress is predominant. Swivel jointed flexible high pressure hose permits use at any angle.

CONSTRUCTION WIRING

Cost comparison was made recently on a construction job involving 160 connections for wire of average size. The savings on Hydent connectors (against cast connectors) more than paid for the Hypress. On future jobs this contractor will save over 80% of his former connector cost. Even against the most economical type of bolted connector, savings would average 40%-50%.

BURNDY ENGINEERING COMPANY

NORWALK, CONNECTICUT • BURNDY CANADA, LTD., Toronto 8, Ontario

strand is a controlled material

your steel allotment for guy strand will go 3 times as far with PLP GUY-GRIPS

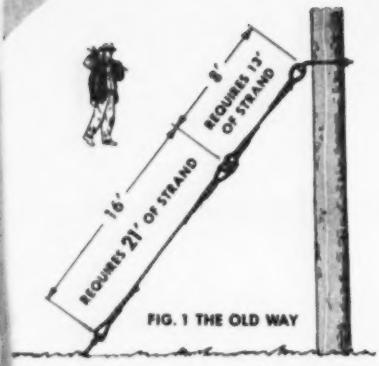


FIG. 1 THE OLD WAY

FIG. 2 THE PLP WAY

● With PLP GUY-GRIPS, you save critical guy strand and get stronger, safer guys. *For example,* let's consider the 24-foot, 6000# guy (Fig. 1). Doing the job in this conventional way, using Siemens-Martin Strand, requires:

13′ of 3/8″ strand (TS 6950#) weighing 273#/1000′ = 3.549 lbs.
21′ of 3/8″ strand (TS 6950#) weighing 273#/1000′ = 5.733 lbs.
9.282 lbs.

But the equivalent PLP Guy-Grip installation (Fig. 2) using 3-wire Extra-High Strength strand, requires only:

6½′ of 1/4″ EHS strand (TS 6600#) weighing 116.7#/1000′ = 0.759 lbs.
14½′ of 1/4″ EHS strand (TS 6600#) weighing 116.7#/1000′ = 1.692 lbs.
2.451 lbs.

SAVING --- 6.831 lbs.

Making this Guy the PLP way results in a saving of 73% of critical guy strand . . . and you eliminate the need of any clamps.

With PLP Guy-Grips, even wrenches are not needed. Simply install by hand! (Fig. 4). Any lineman . . . regardless of his skill . . . can do a perfect job every time. *Installation time is cut in half.*

Substantial dollar savings are the result even with "B" and "C" coated strand.

PLP Guy-Grips are available for strand sizes from 1/4″ through 1/2″.

FIG. 3—PLP Guy-Grips consist of Preformed Armor Rods preassembled in Guy-Grip sets.

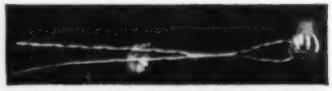


FIG. 4—To install, simply pass through guy-strain insulator or "through-bolt" and rotate ends around guy strand . . . by hand.

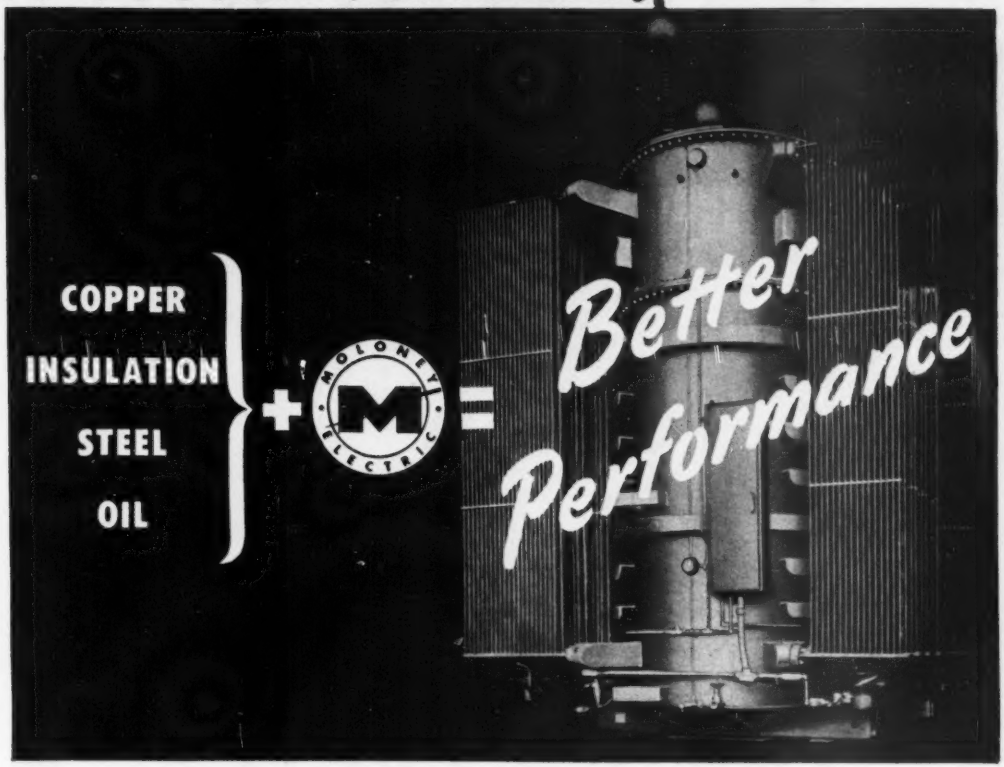
FIG. 5—PLP Guy-Grips assure the same tight gripping action as in the case of splices.

PREFORMED LINE PRODUCTS CO.

5349 ST. CLAIR AVE. • CLEVELAND 3, OHIO

Telephone: EXpress 1-3571

A Proven Formula!



ALTHOUGH the same basic materials—copper, insulation, steel and oil—are used in the construction of any power transformer, the intangible "know how" is the most important factor contributing to its quality of performance. Moloney has acquired this knowledge and skill through experience in the manufacture of transformers exclusively since 1896. Engineering and manufacturing facilities are supplemented by a complete test department which includes a 3,500,000 volt surge generator. Operating records prove that you can expect *better* performance, *less* maintenance cost and *greater* reliability from Moloney Transformers.

MEB1-10

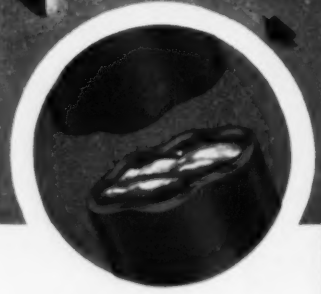
MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

BLACKBURN *Copper-Bonded* GROUND ROD



THESE 5 POINTS

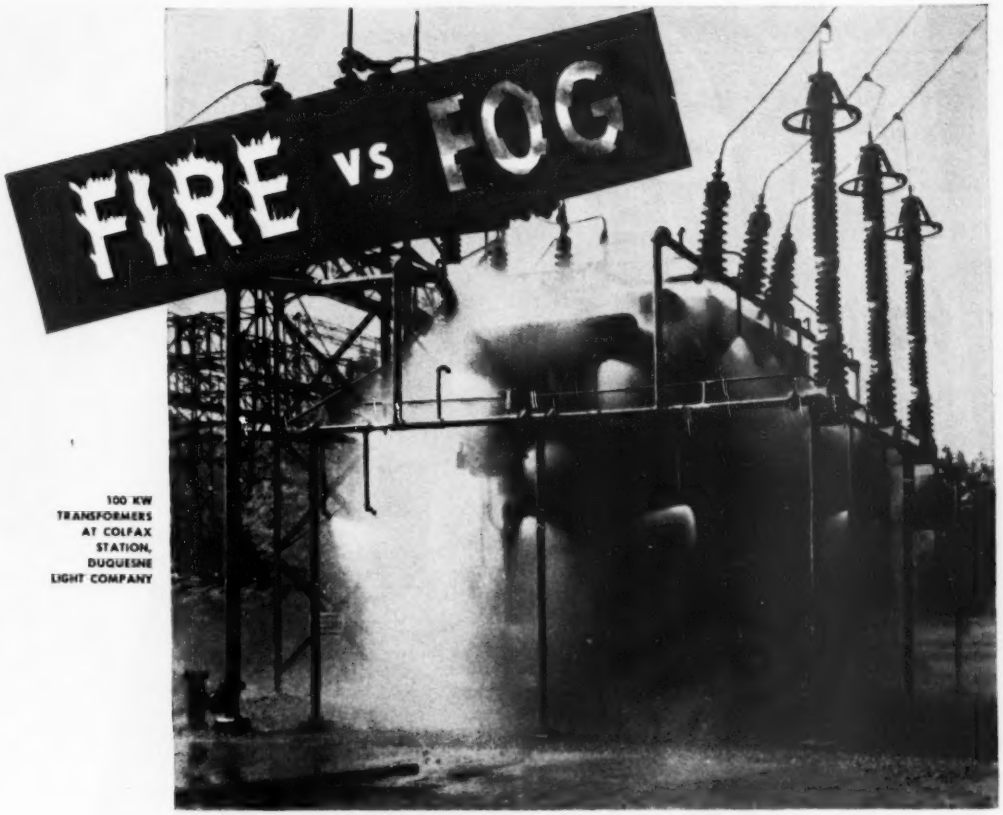
Assure You of Permanent, Efficient Grounding and Quick Dependable Service

1. A hard-drawn, rigid steel core, for ease of driving.
2. Completely covered, including top and bottom, with a heavy, uniform coating of pure copper, molecularly bonded, to fully protect steel core.
3. Rolled finish produces hard, scar-resistant surface.
4. Stocked by leading wholesalers — backed up by a stable, dependable source, strategically located for quick shipments to all parts of the country.
5. Backed by Blackburn's reputation for quality and value.

Distributed on the West Coast by KORTICK Manufacturing Company

JASPER BLACKBURN CORPORATION

35 Madison St., St. Louis 6, Mo. • Phone CEntral 3007



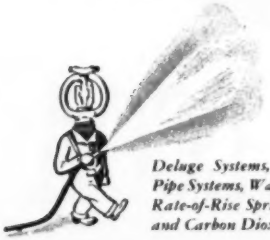
100 KW TRANSFORMERS AT COLFAX STATION, DUQUESNE LIGHT COMPANY

CHALLENGER IS SMOTHERED IN FIRST MINUTE OF FIRST ROUND!

The real hazard of a transformer fire is the resulting black-out of power and light service to homes, hospitals, defense plants and municipal properties. You can protect your customers by protecting your transformers with a BLAW-KNOX AUTOMATIC FOG SYSTEM.

Through fast-acting, rate-of-rise thermostats, any critically hot transformer is instantly blanketed with a heavy, quenching "fog" of water, confining the damage and protecting adjacent areas . . . materially reducing power failures in both frequency and extent. Without obligation Blaw-Knox engineers will survey your fire hazards, make a layout of the most efficient system and estimate costs. Blaw-Knox Fire Protection Systems carry the approval of all underwriters.

BLAW-KNOX SPRINKLER DIVISION
OF BLAW-KNOX CONSTRUCTION COMPANY
829 Beaver Ave., N.S., Pittsburgh 33, Pa.
Offices in Principal Cities

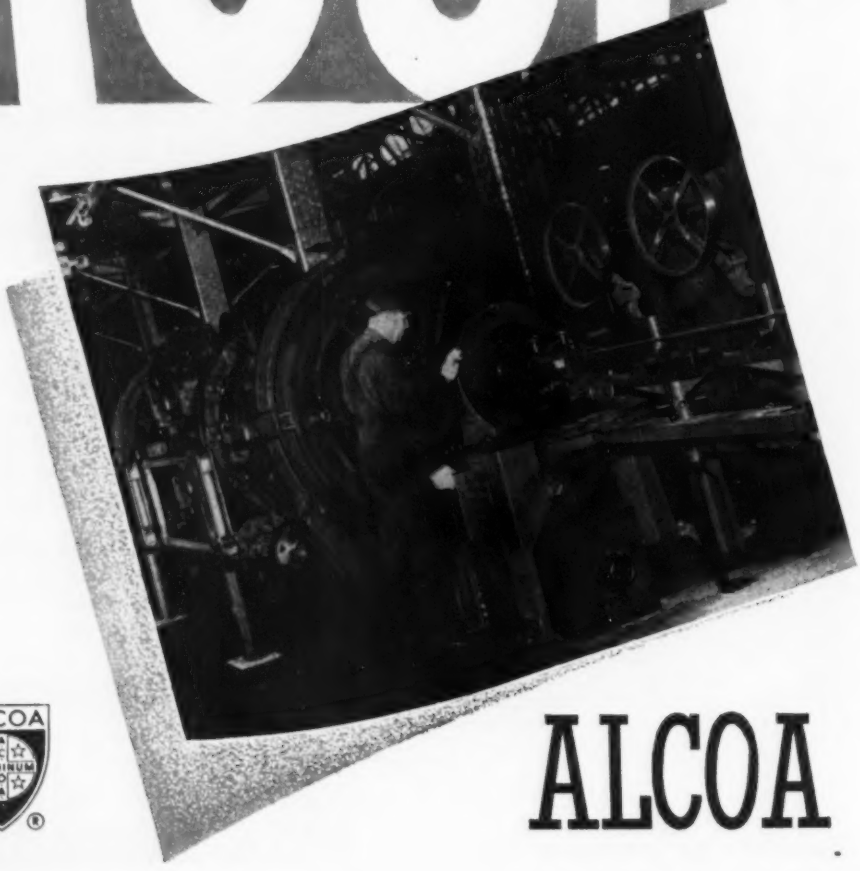


"LITTLE JOEY SPRINKLER"
Always on the Job

Deluge Systems, Wet Pipe Systems, Dry Pipe Systems, Water Spray and Fog Systems, Rate-of-Rise Sprinkler Systems, and Foam and Carbon Dioxide Extinguisher Systems.

BLAW-KNOX

ACSR



ALCOA

and Alcoa Workmanship

Over 2,000,000 miles of ACSR have been produced by Alcoa. Positive testimony to the *quality* cable offered by Alcoa.

Today, the same exacting workmanship that governed this total continues to supply you with the best ACSR. Shown here is one of many stranding machines that spins strong, light weight cable at Alcoa's Mills.

Exacting inspections maintain the high standards of Alcoa ACSR. This assures you cable with uniform stranding . . . steel core wire rigidly inspected to meet ASTM specifications . . . cable in uniform lengths, clearly marked on reels.

You get *quality* cable plus Alcoa's 54 years' cable experience. Our field engineers can offer you up-to-date installation and maintenance techniques. Call the nearest Alcoa Sales Office or write:

ALUMINUM COMPANY OF AMERICA
2100C Gulf Building • Pittsburgh 19, Pennsylvania

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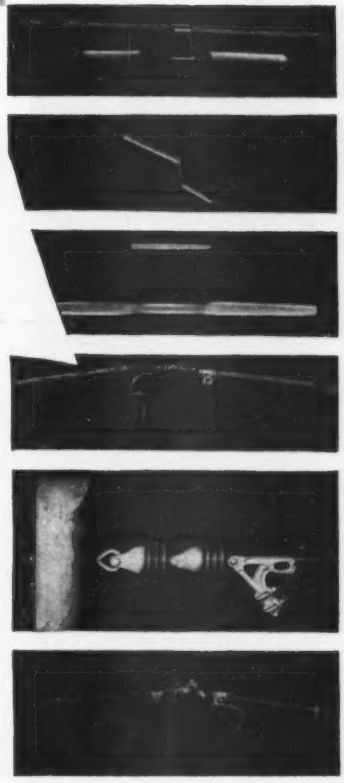
FIRST IN ALUMINUM FIRST IN A·C·S·R

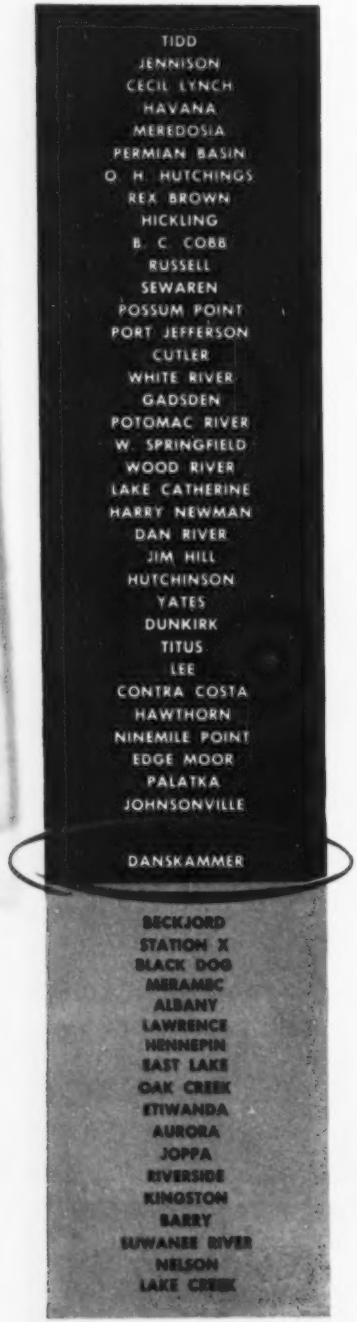
ALCOA ACCESSORIES

Alcoa has developed a complete line of aluminum accessories to help you build your T. & D. lines faster and better.



NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.



New goes into

The rapidly expanding power facilities of New York State received another substantial addition recently when the Danskammer Point Steam Station of the Central Hudson Gas & Electric Corporation was placed in service.

Located at Danskammer Point on the west shore of the Hudson River just north of Newburgh, N. Y., Danskammer Point is the first major *steam* plant of the Central Hudson system, which has heretofore depended largely on its hydro stations and purchased power. The system, serving an area of 2500 square miles in all or part of eight counties along the Hudson, is interconnected with adjacent systems in New York, New Jersey and Connecticut.

Long range plans contemplate four generating units in this station and the first in service is a reheat turbine-generator rated at 60/66,000 Kw operating at a throttle pressure of 1650 psi with primary steam temperature of 1000 F. reheated to 1000 F. The unit went on the line in December 1951. Burns and Roe, Inc. are the Consulting Engineers.

Steam for this unit is supplied by a C-E Steam Generating Unit of the reheat type a cross-sectional elevation and brief description of which appears on the opposite page.

B-556

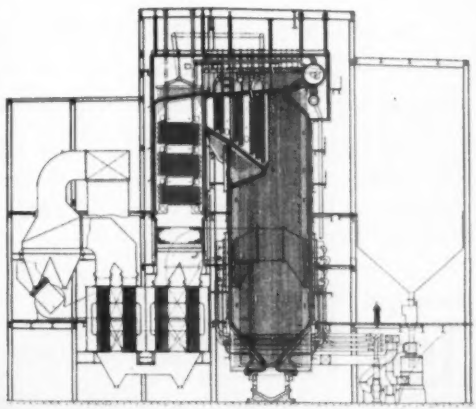
C-E

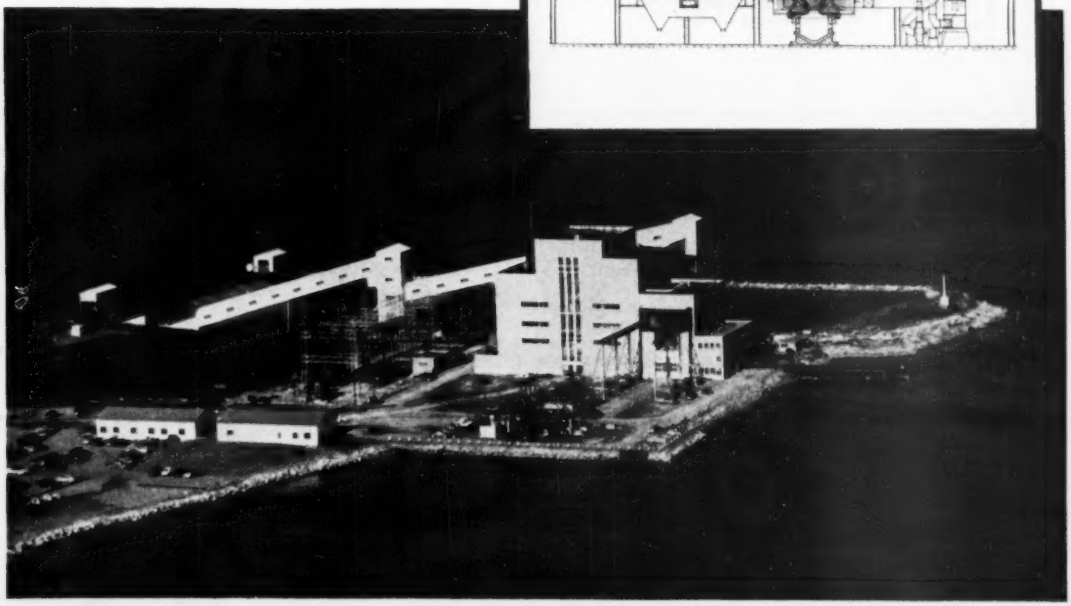
COMBUSTION

200 MADISON AVENUE, NEW YORK 16, N. Y.

Danskammer Point Station service

The cross-sectional view at the right shows the C-E Unit now in service at the Danskammer Point Station. It is of the radiant, reheat type with the reheating surface located between the primary and secondary superheaters. A finned tube economizer is located below the rear superheater section and tubular type air heater surface follows the economizer. The unit is pulverized coal fired using bowl mills and tilting, tangential burners. The fully water-cooled furnace is of the basket-bottom type discharging to a sluicing ash hopper.





ENGINEERING—SUPERHEATER, INC.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

Task Matched industrial lighting **plus** "Springlox"...

only BENJAMIN "Magna-Flo" systems bring you *Both!*

No other T12 Slimline System is SO COMPLETE! No other lighting system has "Springlox" Lampholders! Only Benjamin "Magna-Flo" Systems bring you BOTH these advantages, so important to BETTER SEEING and QUICKER MAINTENANCE.

FREE DATA BULLETIN AD5705 brings you complete "Magna-Flo" specifications and details of the hundreds of "Magna-Flo" combinations which make possible lighting TO MATCH ANY INDUSTRIAL SEEING TASK! Benjamin Electric Mfg. Co., Dept. K. Des Plaines, Illinois.

for BETTER SEEING...

1 Task Matched Lighting Installations

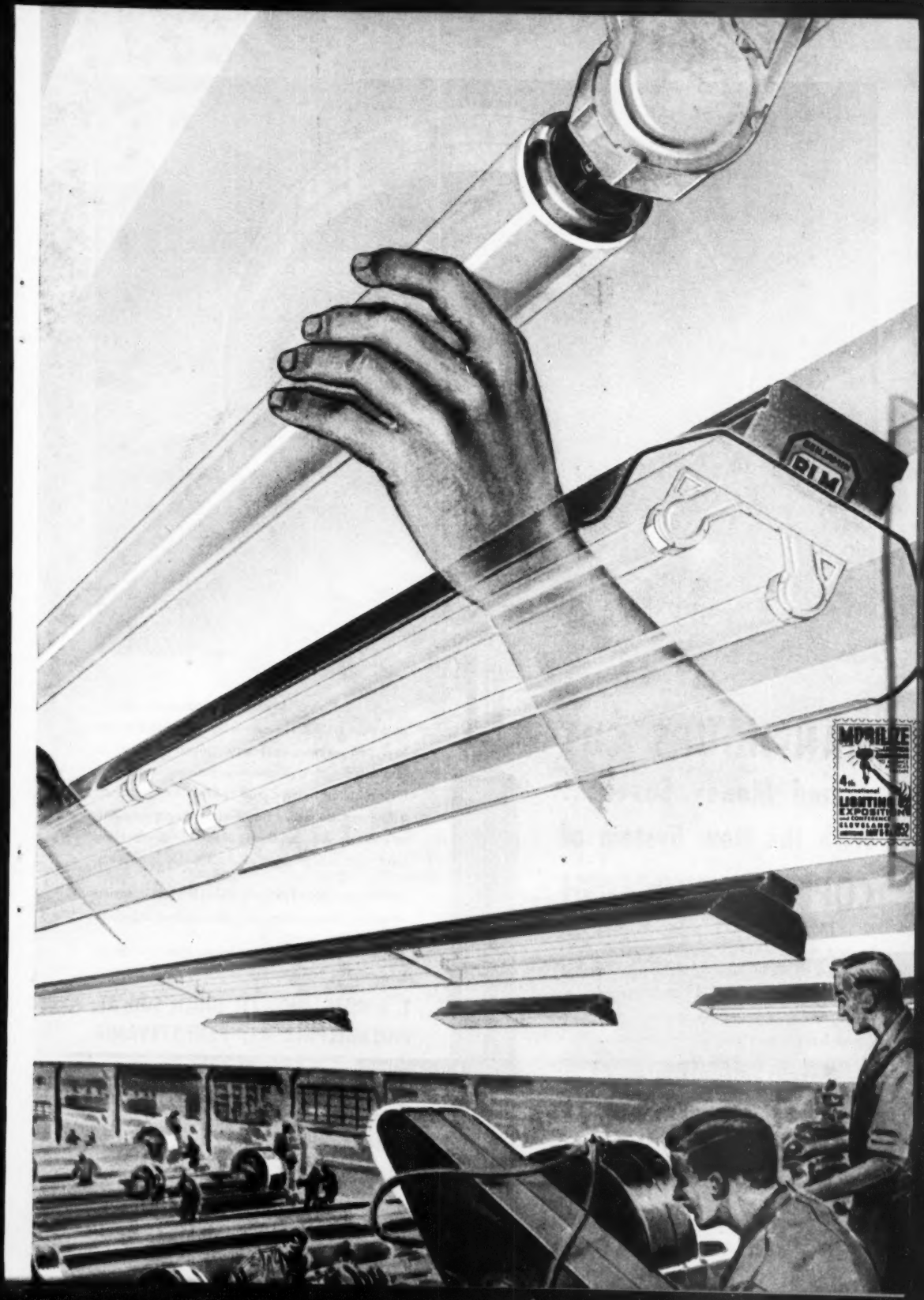
You get BETTER SEEING, because the "Magna-Flo" Line is so complete that you can always specify units which are MATCHED TO THE SEEING TASK! No need to settle for "second choices" or substitute sizes and types! Just three channels and four reflectors form the basis for HUNDREDS OF COMBINATIONS! Assembly lines or drafting tables, inspection or production lighting, lighting for the discernment of fine detail or adequate light for larger work . . . whatever the seeing task, it can be MATCHED with "MAGNA-FLO".

48", 72" and 96" CHANNELS for T12 LAMPS and REFLECTORS } with 2 or 3-lamp "Springlox"... in INDIVIDUAL UNITS or CONTINUOUS LINES... with APERTURES, LOUVERS, COVERS or SHIELDS... Suspended by CHAIN, CONDUIT, CABLE, SINGLE-ROD, CEILING or TWIN-ROD.

for QUICKER MAINTENANCE...

2 "Springlox" Lampholders

There's nothing like this rugged, all-metal, patented Benjamin fluorescent lampholder for "quick-in, quick-out" lamp servicing that speeds up relamping and improves reflector maintenance. "Springlox" is one of the important exclusive advantages that make "Magna-Flo" Systems outstanding. It is a "MAGNA-FLO" PLUS that COSTS NOTHING EXTRA! In addition to its maintenance speed-up features, "Springlox" assures (1) COMPLETE SAFETY from lamps dropping out or being loosened by vibration, because it is self-adjusting for slight differences in lamp lengths; and (2) NEVER-FAILING SAFETY CONTACT because of a built-in "easy-make, easy-break" circuit switch.


BIM

MAN-HOURS CUT

...and Money Saved... With the New System of COPE CABLE TROUGH

To save man-hours in today's Emergency is vitally important. That's why utilities, industrial plants and government agencies have installed the new simplified, versatile and time-saving Cope Cable Trough in preference to using old-fashioned methods of carrying control cables and instrument tubing.

During all stages—from the moment the Design Engineer specifies the use of Cope Cable Trough—during the time it is installed—and at the time the cable is being laid—man-hour after man-hour is saved by using Cope Cable Trough. The Design Engineer can order a complete installation as easily as a pipe system. The men in the field find it simple to install—where necessary, trough can be cut and fitted with a hack-saw—the only installation tools required being a pair of pliers and a wrench. Cable can be easily installed in the trough. And to meet unusual conditions, the Cope Engineering Staff will design special fittings for customers.

Yes! Cope Cable Trough is doing its part in saving —saving labor, saving material and saving costs.

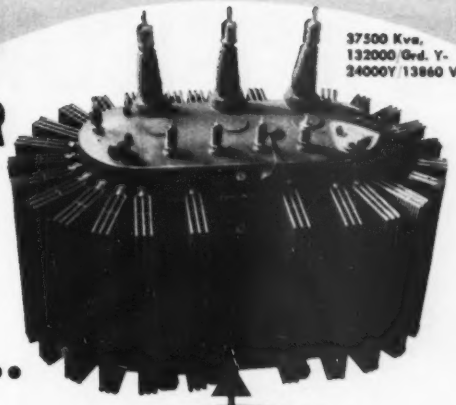
Write today for your copy of the new bulletin on Cope Cable Trough.

T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

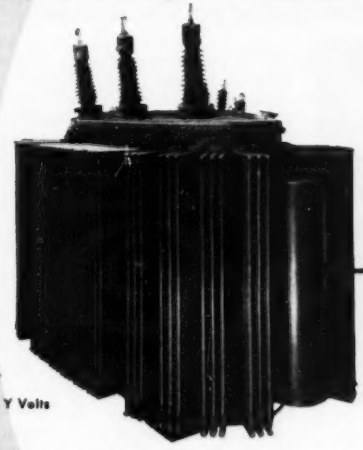
T. J. Cope INC.

You know Cope by these Products . . .

One of these large SELF-COOLED POWER TRANSFORMERS could have been ordered by YOU...



37500 Kva,
132000 Grd. Y-
24000Y/13860 Volts



20000 Kva,
110000Δ-
34500 Grd. Y Volts

INERT GAS PRESSURE

INERT GAS-OIL SEAL

Method of OIL PRESERVATION

OIL EXPANSION TANK

25000/31250 Kva,
72000Y-13800Δ Volts

If you are a user of transformers, you probably prefer a particular method of oil preservation for your transformers.

Here are three Power Transformers that were recently manufactured by Pennsylvania Transformer Company. Of special interest is the fact that each transformer is equipped with a different method of oil preservation.

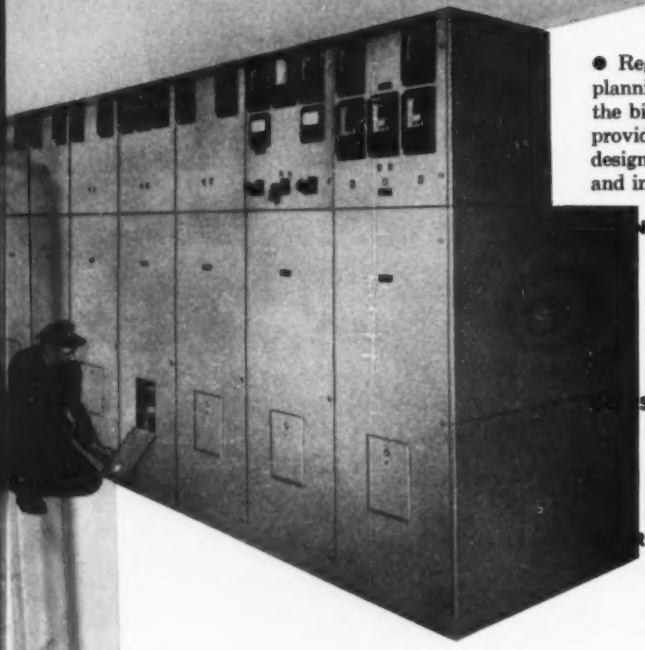
No doubt one of these methods, if not all of them, would meet with your requirements. But no matter what oil preservation method you specify, you can be certain that when it is incorporated into a Pennsylvania Transformer, it will function efficiently with the same amount of dependability as the rest of the transformer.

Pennsylvania TRANSFORMERS

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PA. • *Greater Pittsburgh District*

I-T-E METALCLAD SWITCHGEAR



● Regardless of your engineering responsibility—planning, construction, or operation—you'll welcome the big advantages that I-T-E Metalclad Switchgear provides. Since 1937 the soundness of the I-T-E design has proved itself in central stations, steel mills, and industrial plants the world over.

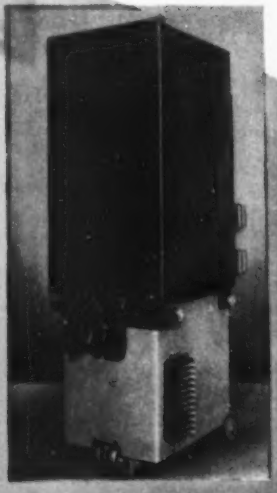
NNING: Planning engineers, concerned with plant wide equipment protection problems in new and expanded distribution systems, prefer I-T-E Metalclad Switchgear because for 15 years, it has assured safe, positive arc interruption. Planning is easier because I-T-E supplies indoor and outdoor equipments in standard structures that are compact, uniform, and readily expandable.

STRUCTION: Construction engineers like the way I-T-E speeds switchgear installation. I-T-E forwards channel bases in advance, so that floors can be prepared ahead of equipment arrival. The arrangement of I-T-E Metalclad Switchgear simplifies the pulling of primary and control cable.

RATION: Operating engineers have to live with switchgear once it's in place. They like I-T-E Metalclad Switchgear because double interlocking makes it safe and easy to operate. The famous "fast-test" feature makes short work of secondary circuit testing—even eliminates opening the breaker door.

4160 VOLTS • 50,000 AND 150,000 KVA INTERRUPTING • 600, 1200, AND 2000 AMPERES CONTINUOUS

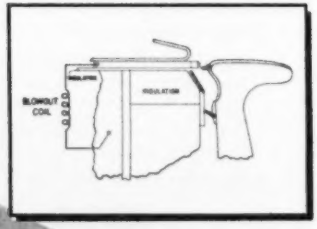
For information, including selection and application data, write for Catalog Section 7004 and Bulletin 7000-A, I-T-E Circuit Breaker Company, 19th & Hamilton Streets, Philadelphia 30, Pennsylvania.



PLANNING ENGINEERS

I-T-E Metalclad Switchgear provides safe, positive arc interruption because I-T-E Type HV circuit breakers are used throughout.

When opening short circuit current near rating, the I-T-E HV breaker interrupts the current so quickly that the moving contact travels only about one inch before the circuit is interrupted. Extra contact travel is provided for interruption of very low current.



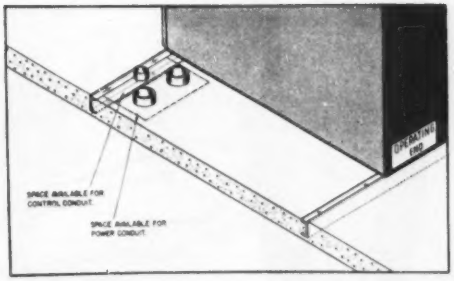
LONG-LIVED INTERRUPTING ABILITY

Arc transfer energizes blowout coil and eliminates metallic connection between front runner and lower current stud. Thus, potential is across arc chute only during arc interruption—resulting in longer chute life.

PROVES ITS ENGINEER APPEAL

CONSTRUCTION ENGINEERS

I-T-E provides switchboard floor plans, front view drawings and single line diagrams well ahead of shipment. When you're ready, I-T-E forwards channel bases—your equipment goes in right on schedule! Control and primary cables can enter structure at top or bottom. Control cable connections are located just inside the removable rear panel. You have them completely accessible for inspection and checking *without* de-energizing the circuit, *without* removing the breaker, *without* entering the switchgear structure.



OPERATING ENGINEERS

Important operating advantages of I-T-E Metalclad Switchgear save steps and guard your safety. Here are just a few of them:

1. Secondary circuit testing without removal of breakers from the stationary structure. No separate operation of secondary disconnecting devices is required.
2. The double interlock assures complete safety of personnel and equipment—guards against improper insertion or withdrawal of the circuit breakers. Interlocks are built into the circuit breaker—eliminating complicated engagement mechanisms between the breaker and structure. Adjustments are simplified and interchangeability is assured.
3. Circuit breaker control-relay is mounted on breaker truck; (when breaker comes out, relay comes out. No "climbing" into structure to inspect control-relay).
4. Truck-mounted horizontal removable elements eliminate hours of maintenance usually required for complicated elevator mechanisms.

Full operating positioning is accomplished by mechanical racking.

Specify I-T-E **METALCLAD SWITCHGEAR**

I-T-E CIRCUIT BREAKER CO. • 19th & HAMILTON STS. • PHILA. 30, PA.

R&IE Equipment Division, Greensburg, Pa. • Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., N.Y. 17, N.Y.

WHY DO IT THE HARD WAY? . . . . by BUSTER

There's a CRESTOLOY PLIER for EVERY JOB

Here's Buster again . . . busting his thumb. The pliers he's using are good pliers but they're not made for heavy cutting. Perhaps he has learned a lesson and will send for a copy of "How to Use Hand Tools." His best bet however, is to look at the Crescent display board at his Hardware Dealer's. There he will quickly discover that the right tool for this job is a CRESTOLOY No. 2150 Lineman's Plier. It's light-weight but stronger, streamlined with hand-honed cutting edges. Ask for CRESTOLOY TOOLS at your hardware dealer.

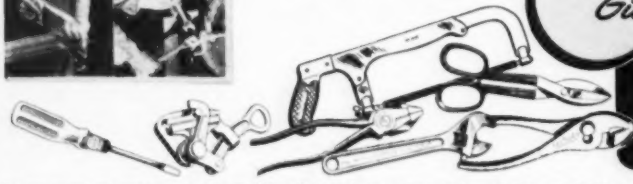
HOW TO USE HAND TOOLS

◀FREE BOOK!

Has all the answers. It tells what tools to use and how to use them. Fully illustrated. A postcard will bring it to you. Send today.

CRESCENT TOOLS
Give Wings to Work

Sign of the Artisan
Symbol of Excellence

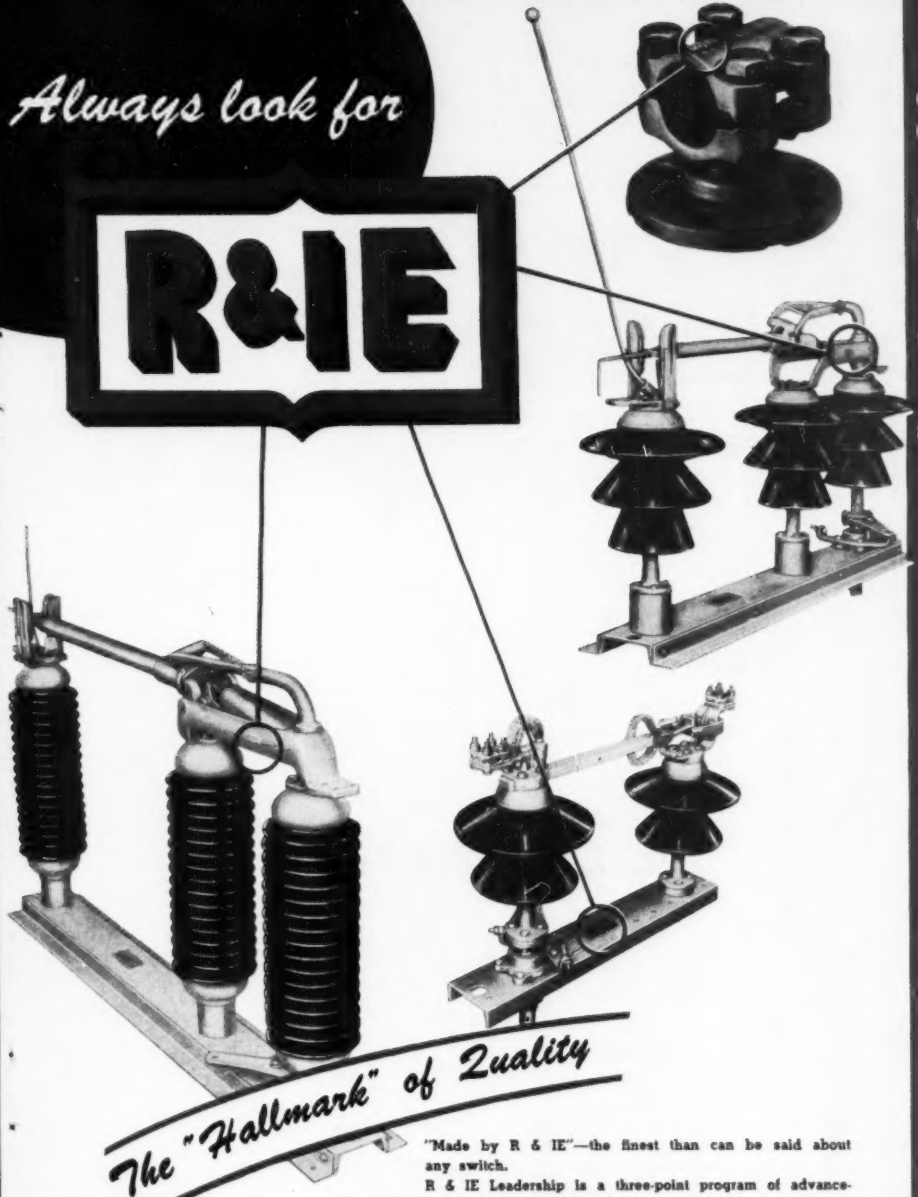


Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Always look for

R&IE



The "Hallmark" of Quality

"Made by R & IE"—the finest than can be said about any switch.

R & IE Leadership is a three-point program of advancement—1. Progressive Design. 2. Consistent Manufacturing Quality. 3. Customer Cooperation. The trademark R&IE represents years of engineering achievement plus safe, economic and reliable service.

With the change of name as shown below, R & IE Leadership will continue with the same skill and know-how that has brought complete customer satisfaction in the past. Always look for the R & IE trademark—"the Hallmark of Quality".

R&IE EQUIPMENT DIVISION

OF I-T-E CIRCUIT BREAKER COMPANY

GREENSBURG, PA.

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES
INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

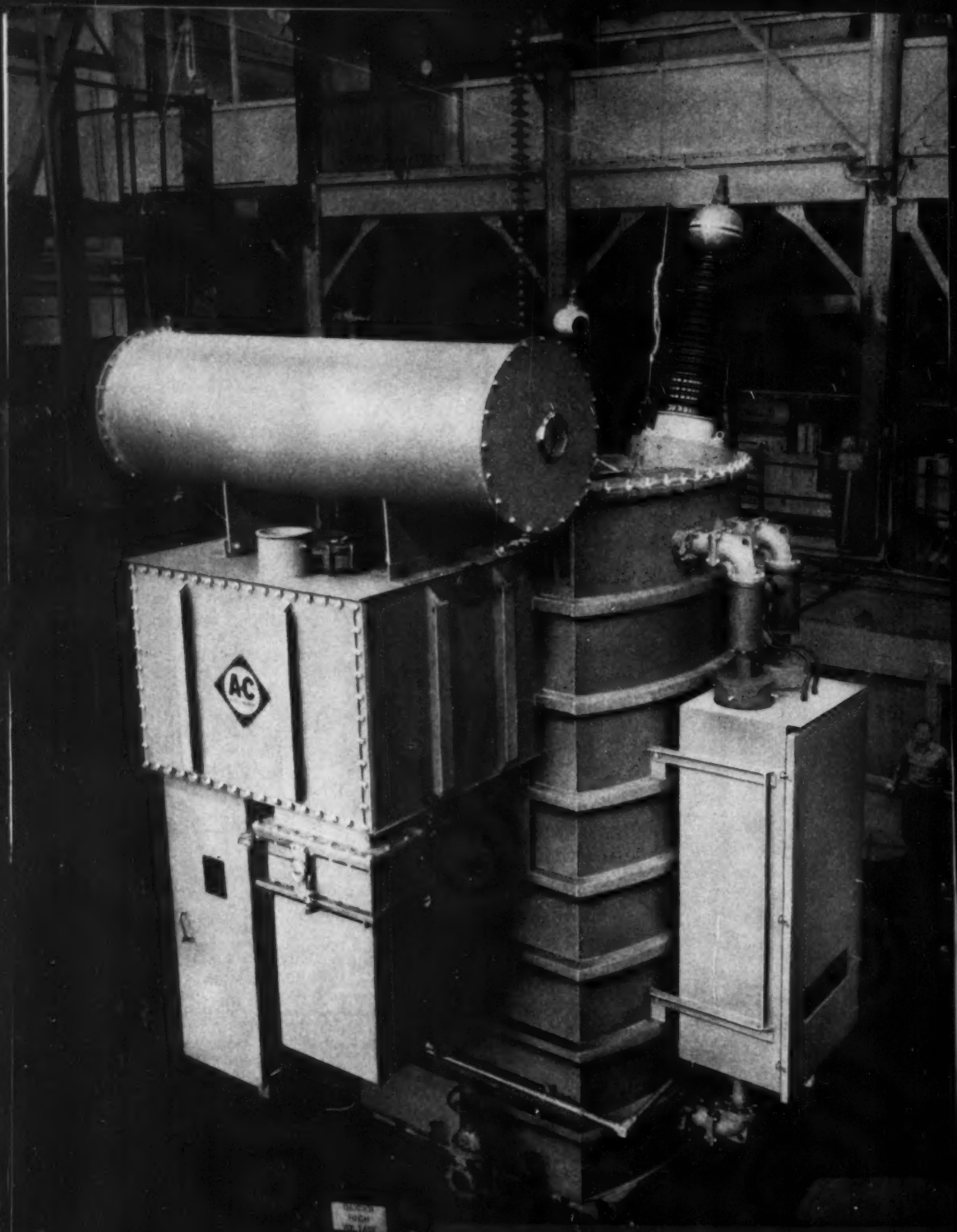
OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

TESTING DEVICES


AC
CORONA-FREE DESIGN

ANOTHER

CORONA *free*

TRANSFORMER

• *What Is Corona?*

Corona, a dielectric discharge, ionizes, heats and chars insulation and then permits insulation to conduct electricity. If corona is present, insulation has already started to break down, but the transformer may continue to operate. Your transformer may not fail at the first sign of corona, a month later or even a year later, but its fate is decided. Corona will continue its attacks on insulation even though voltage stresses do not increase. In time, insulation will become conductive. That means trouble.

• *What Is CORONA-FREE Design?*

Corona-free design eliminates dangerous corona. Corona-free transformers are designed to be free of slightest corona that could harm transformers in years of operation.

This design is the result of a number of transformer improvements. It means high voltage parts are shielded, dielectric fields redirected and insulation properly spaced near high voltage conductors.

Allis-Chalmers transformers are designed to be corona-free at even the highest test voltages.

A-3550

Allis-Chalmers
Milwaukee 1, Wis.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

PARAMOUNT FRICTION TAPE by Haartz-Mason

1

Made under the most exacting requirements in the industry, Paramount Friction tape can be tightly wrapped — yet can be torn readily as required. A margin of safety in this respect is added to every roll of Paramount Friction tape.

2

In order to assure maximum insulation and protection against moisture, friction tape should be as free as possible from pinholes. The materials and methods and new equipment used in making Paramount Friction tape assure virtual non-existence of pinholes.

3

Automatically cut with smooth, neat edges on Cameron cutting machines. These machines wind it on the cores under tension. This is your insurance against ravelling.

4

Under controlled temperature and humidity, Paramount Friction tape is strictly tested for permanence of adhesion.

5

Taken from stock at regular intervals, sample rolls of Paramount Friction tape undergo accelerated aging tests in an electric oven at 212° F. for 16 hours. Thus you get a guarantee of maximum aging ability.

6

Every roll of Paramount Friction tape is sold with guaranteed minimum footage per roll plus . . . guaranteed weight. You are left in no doubt about what you are getting. And so you know you will cover the largest area most efficiently at the lowest cost.

7

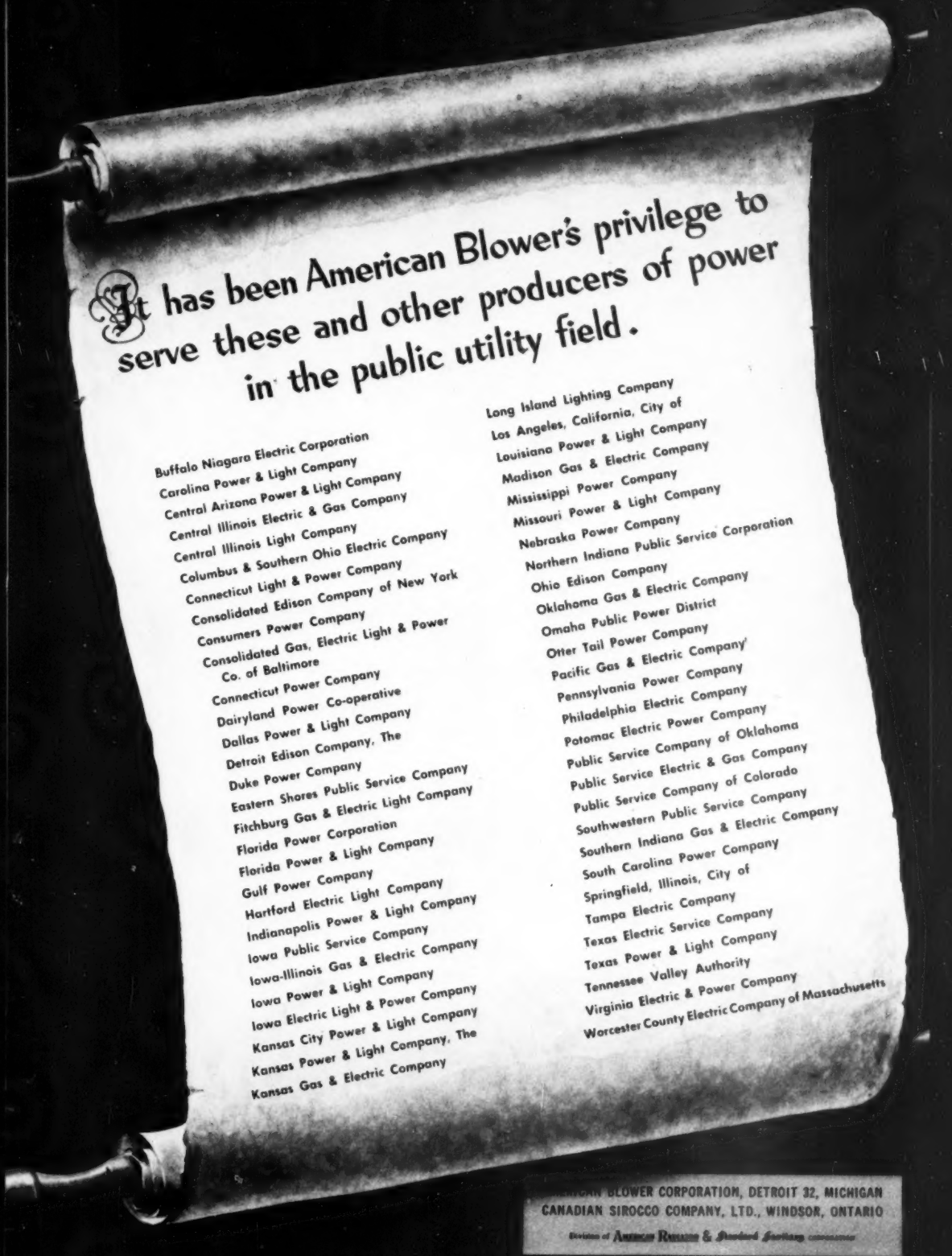
To sum up, Paramount Friction tape, besides being made of finest materials, also undergoes rigorous pre-testing at the factory. Among the rigidly conducted tests are those for aging, adhesion and strength.

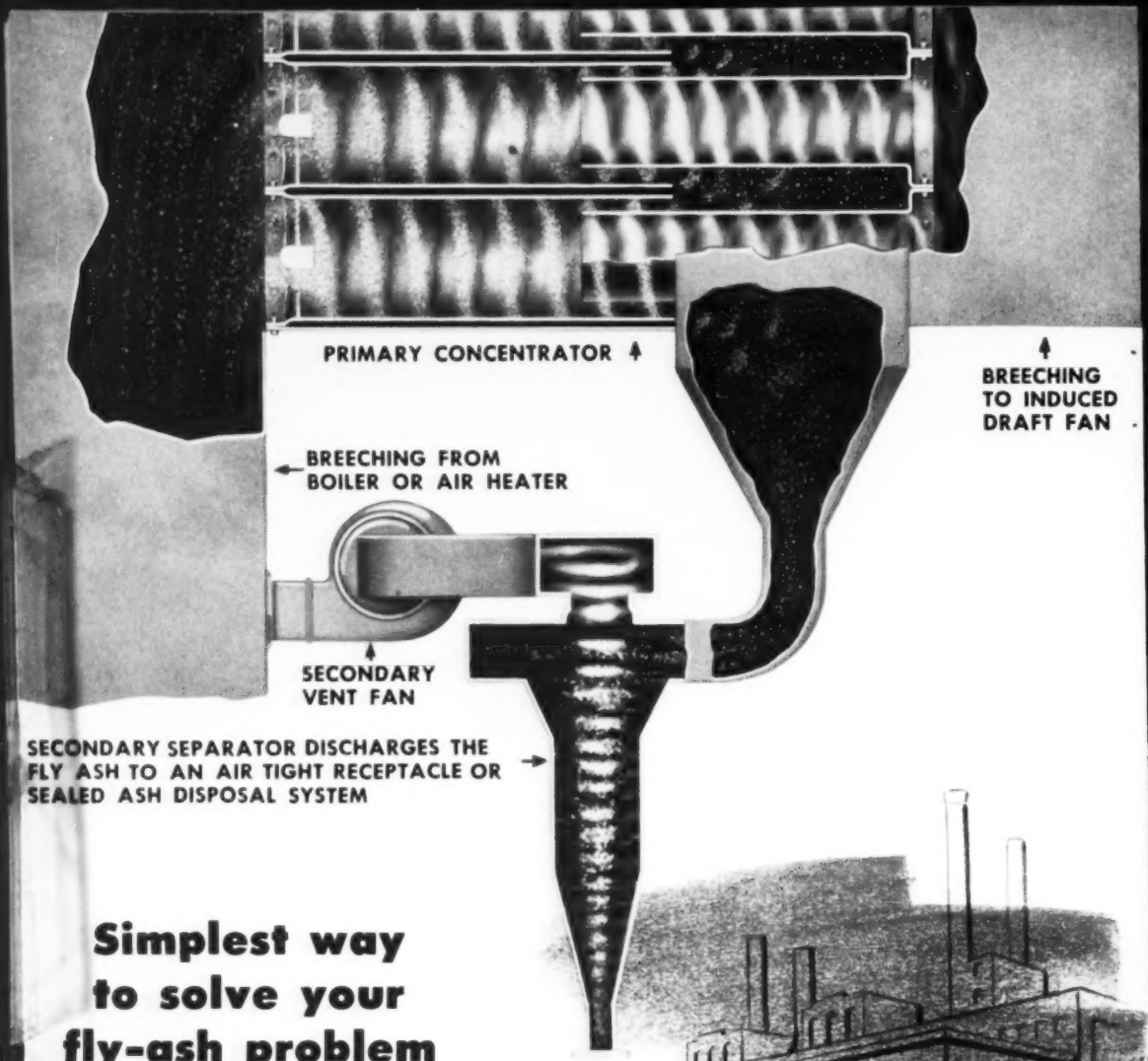
Dual Guarantee on Weight and Length

Manufactured by

Haartz-Mason, Inc.

WATERTOWN 72, MASS.


It has been American Blower's privilege to serve these and other producers of power in the public utility field.
Buffalo Niagara Electric Corporation
Carolina Power & Light Company
Central Arizona Power & Light Company
Central Illinois Electric & Gas Company
Central Illinois Light Company
Columbus & Southern Ohio Electric Company
Connecticut Light & Power Company
Consolidated Edison Company of New York
Consumers Power Company
Consolidated Gas, Electric Light & Power Co. of Baltimore
Connecticut Power Company
Dairyland Power Co-operative
Dallas Power & Light Company
Detroit Edison Company, The
Duke Power Company
Eastern Shores Public Service Company
Fitchburg Gas & Electric Light Company
Florida Power Corporation
Florida Power & Light Company
Gulf Power Company
Hartford Electric Light Company
Indianapolis Power & Light Company
Iowa Public Service Company
Iowa-Illinois Gas & Electric Company
Iowa Power & Light Company
Iowa Electric Light & Power Company
Kansas City Power & Light Company
Kansas Power & Light Company, The
Kansas Gas & Electric Company
Long Island Lighting Company
Los Angeles, California, City of
Louisiana Power & Light Company
Madison Gas & Electric Company
Mississippi Power Company
Missouri Power & Light Company
Nebraska Power Company
Northern Indiana Public Service Corporation
Ohio Edison Company
Oklahoma Gas & Electric Company
Omaha Public Power District
Otter Tail Power Company
Pacific Gas & Electric Company
Pennsylvania Power Company
Philadelphia Electric Company
Potomac Electric Power Company
Public Service Company of Oklahoma
Public Service Electric & Gas Company
Public Service Company of Colorado
Southwestern Public Service Company
Southern Indiana Gas & Electric Company
South Carolina Power Company
Springfield, Illinois, City of
Tampa Electric Company
Texas Electric Service Company
Texas Power & Light Company
Tennessee Valley Authority
Virginia Electric & Power Company
Worcester County Electric Company of Massachusetts
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

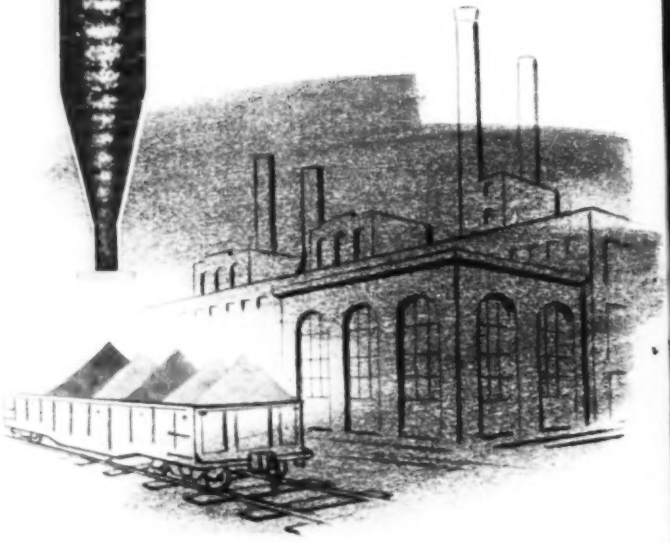

PRIMARY CONCENTRATOR
BREECHING TO INDUCED DRAFT FAN
BREECHING FROM BOILER OR AIR HEATER
SECONDARY VENT FAN
SECONDARY SEPARATOR DISCHARGES THE FLY ASH TO AN AIR TIGHT RECEPTACLE OR SEALED ASH DISPOSAL SYSTEM

Simplest way to solve your fly-ash problem

Install a Type ST Fly Ash Precipitator like that shown above.

On a given application, as the load falls off and fly ash becomes more difficult to catch, the ST Precipitator automatically maintains higher efficiency than any other collector of mechanical type.

Contact the nearest of many American Blower and Canadian Sirocco Branch Offices, strategically located throughout the United States and Canada, for complete information on Type ST Fly Ash Precipitators.



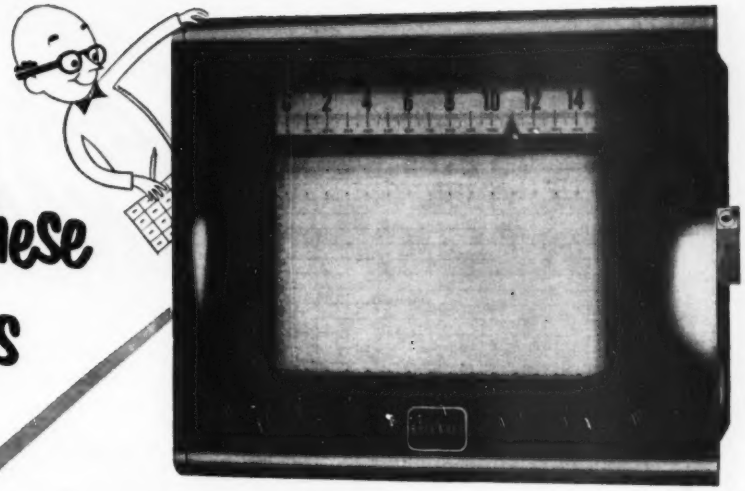
AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON



Check these features OF THE BRISTOL DYNAMASTER

—the electronic master-mind for your measuring, recording and telemetering problems

- ✓ Continuous-balancing electronic circuit responds instantly to minute changes
- ✓ All types of electric and air-operated controllers offered
- ✓ Available as a self-balancing bridge or potentiometer
- ✓ Trouble-free operation
- ✓ Electronic component uses vacuum tubes available at any radio supply house
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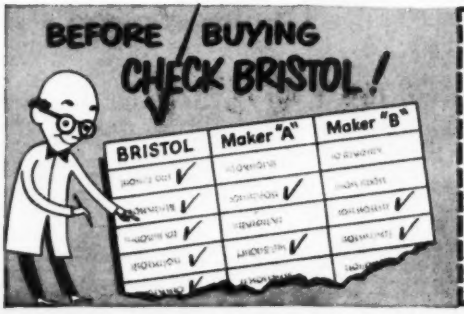
- ✓ Components interchangeable and easily replaced on all Dynamaster models
- ✓ Immune to most vibration or shock
- ✓ Exceptionally unaffected by stray currents (1000 to 1 discrimination).

BRISTOL

FOR DETAILED PROOF *of the sensitivity, versatility and reliability of the electronic Dynamaster, use the coupon or write for Catalog P1245.*

The dependable Guidepost of Industry

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS



THE BRISTOL COMPANY
116 Bristol Road
Waterbury 20, Conn.

Please send catalog giving details of Dynamaster performance to:

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COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Facts from KANSAS

"'CSP' Transformers cut failures to zero"

"Until a few years ago, our system was equipped 100% with conventional transformers. A particularly hot rural line was giving us considerable trouble, so we decided to make a test installation of 'CSP' Transformers comprising 160 stations," says a Kansas Utility.

"Accurate records had been kept for two years prior to installation of the 'CSP' Transformers and were also kept for the two succeeding years. The records show that of the conventional transformers, 45 had been damaged by lightning, and required 491 service trips for re-fusing.

"Of the 'CSP' Transformers, not one was damaged. Only 39 instances occurred where secondary breakers opened to protect the transformers from short-circuits or overloads. This record gave us good reason to adopt the 'CSP' Transformer for all future construction and replacement."

Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following: J-70590

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4-247-B, "Transformer Costs and Their Relation to Profits", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

"CSP" devices . . . originated and patented by Westinghouse.

YOU CAN BE SURE... IF IT'S
Westinghouse
"CSP" DISTRIBUTION TRANSFORMERS

DON'T SETTLE FOR LESS!

PHILCO

Advanced Design MICROWAVE COMMUNICATIONS SYSTEMS

Again Philco leads the way . . . with Philco *Advanced Design* Microwave Communications Systems. Philco's years of experience in microwave development has produced a system unsurpassed in reliability, performance and economy.

All components are of the finest quality, conservatively rated, insuring long life and economical operation and maintenance.

A signal level 1000 times greater than normally required insures dependable service even under the most adverse conditions. Philco *Advanced Design* Microwave is flexible. The broadband microwave channel may be divided to carry up to 24 simultaneous 2-way telephone conversations . . . or be further divided for telegraph, teletype, telemetering, signaling or supervisory circuits.

Years of production experience enable Philco to produce microwave systems for the lowest possible cost consistent with highest quality. Future expansion can be easily accomplished with no loss of original investment.

For dependable communications service 24 hours a day, every day of the year . . . *don't settle for less* than Philco *Advanced Design* Microwave Communications Systems!

PHILCO CORPORATION

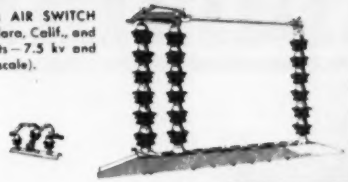
INDUSTRIAL DIVISION

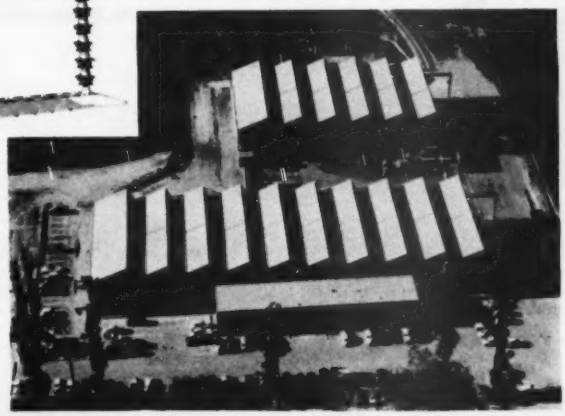
PHILADELPHIA 34, PENNSYLVANIA

Decentralizing for Industry Service

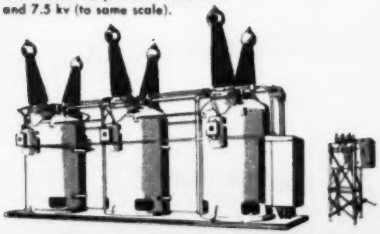
Pacific Electric's circuit breaker division and its air switch division are now in separate plants . . . each with its own design and engineering department.

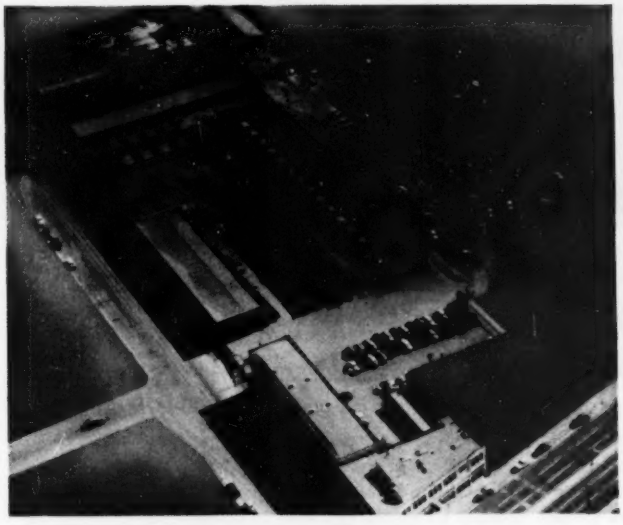
At right: Pacific's AIR SWITCH PLANT at Santa Clara, Calif., and two of its products—7.5 kv and 230 kv (to same scale).





Below: Pacific's CIRCUIT BREAKER PLANT at San Francisco, Calif., and two of its products—230 kv and 7.5 kv (to same scale).





"DO ONE Thing—and do it well" has been Pacific's policy since 1906 when it started making high-voltage switchgear . . . and it has concentrated on this field exclusively ever since.

But the separate sections of this activity—oil circuit breakers on the one hand and air switches on the other—are advancing so rapidly that our customers' interests dictate the advisability of separating these two divisions.

Such a plan is now in full effect with the recent opening of the new air-switch plant at Santa Clara, Calif. The San Francisco plant now manufactures only oil circuit breakers.

This modern decentralized operating plan now places at your service a completely integrated design and manufacturing division thinking only of oil circuit breakers—and a similar equally independent division concentrating on air switches.

As before, the Gary, Indiana, service and assembly plant is supplied from both of the California plants.

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

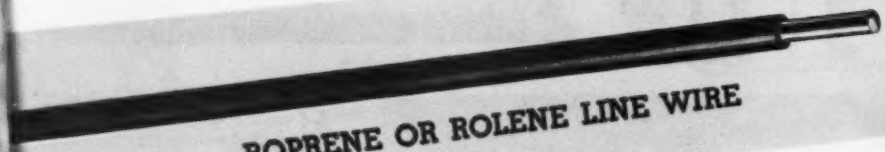
PACIFIC ELECTRIC MFG. CORPORATION

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA • 4500 HARRISON STREET, GARY 10, INDIANA

You get these advantages with

Rome Aluminum

ROPRENE SELF-SUPPORTING SERVICE DROP CABLE



ROPRENE OR ROLENE LINE WIRE

3 BIG REASONS...

Why you are bound to save money with Rome Aluminum Self-Supporting Service Drop Cable and Rome Aluminum Line Wire ... lower purchase cost ... lower installation costs ... longer service life.

Lower purchase cost... Depending upon the service involved, aluminum conductors cost less today.

Lower installation costs... Aluminum's lighter weight means easier and cheaper handling ... in many instances permits longer spans with fewer poles. The simplicity of Rome's Self-Supporting Cable construction means increased savings through cheaper hardware and ease of installation.

Longer service life... Aluminum has proved itself as a long-life conductor material. RoPrene (Neoprene) as well as RoLene (polyethylene) as either insulation or covering has exceptional resistance to sunlight, moisture, corrosive atmospheres and abrasion. With no braids to rot and festoon, replacement is minimized.

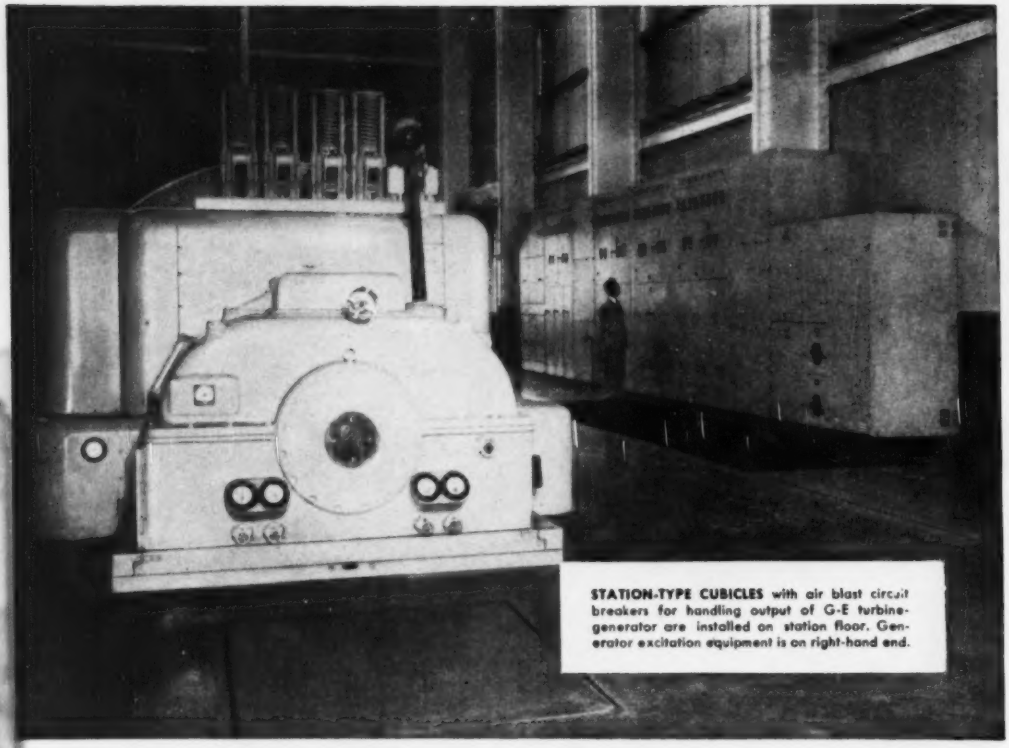
Rome Aluminum Self-Supporting Service Drop Cable is regularly supplied with two RoPrene (Neoprene) insulated power conductors of solid aluminum, spiralled around a bare neutral messenger of ACSR (aluminum conductor steel reinforced). This time-proven construction provides high strength, simplicity of installation.

Rome Aluminum Line Wire is available with covering of RoPrene (Neoprene) or RoLene (polyethylene) as specified. Here is low cost Line Wire having ease of handling, as well as long, non-festooning service life. Uniformly small diameters provide neater appearance, plus reduced wind and ice loading.

It Costs Less to Buy the Best

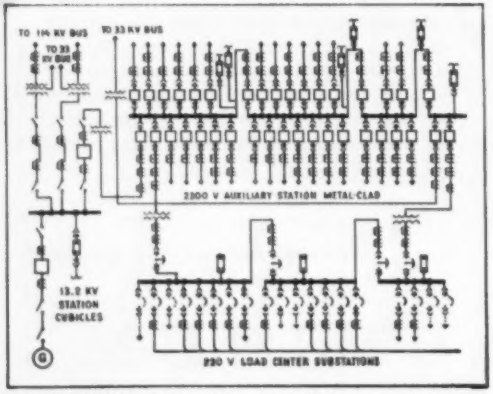
Rome ALUMINUM

ROME CABLE CORPORATION, ROME, N.Y., AND TORRANCE, CALIF.



STATION-TYPE CUBICLES with air blast circuit breakers for handling output of G-E turbine-generator are installed on station floor. Generator excitation equipment is on right-hand end.

60,000-kw station addition uses completely factory-assembled equipment


TO 11K KV BUS
TO 33 KV BUS
TO 33 KV BUS
2300 V AUXILIARY STATION METAL-CLAD
13.2 KV STATION CUBICLES
220 V LOAD CENTER SUBSTATIONS

ONE LINE DIAGRAM of station equipment shows 13.2-kv station cubicles, 2300-v metal-clad switchgear and 220-v station auxiliary load-center unit substations.

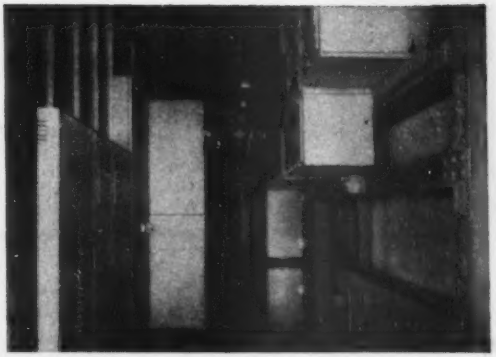
Planned as a Project from Generator to Power Transformer with G-E METAL-ENCLOSED COMPONENTS

An outstanding example of compact, unified design, this 60,000-kw addition to New Jersey Power & Light Company's Gilbert Station illustrates the many advantages of complete station project planning with G-E standardized equipments.

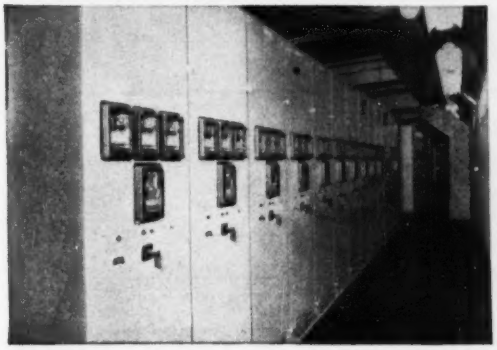
All major units of the plant electrical equipment were supplied as a factory-assembled "package," ready to install. Station engineering was greatly simplified. "On the job" assembly was reduced to a minimum. And complete metal enclosure of all components assures maximum safety and dependability.

For complete information on G-E station-type equipments, see your local G-E sales representative or write to *General Electric Company, Schenectady 5, N. Y.*

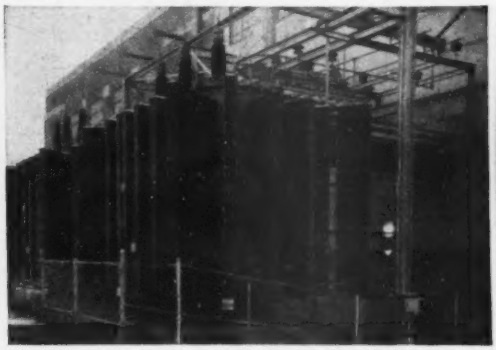
METAL-ENCLOSED ISOLATED-PHASE BUS conducts power from generator to switchgear cubicles and from cubicles to power transformer bank. Close coupling between generator and cubicles saves copper. Factory assembled units were easy to install.



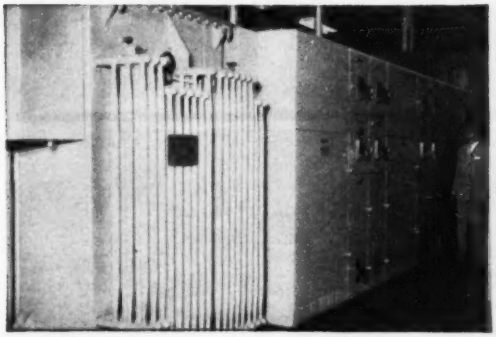
BACK VIEW—STATION CUBICLE SWITCHGEAR AND EXCITER BOARD, showing isolated-phase bus to outdoor power transformers. Metal-enclosed construction gives complete protection. Hinged covers removable for inspection.



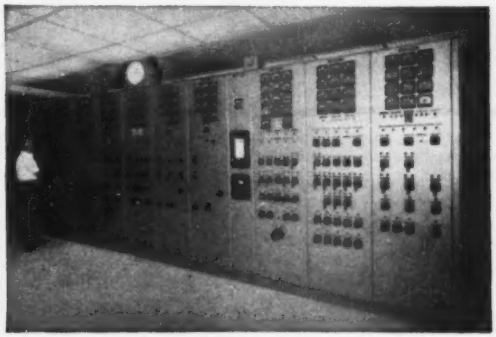
METAL-CLAD SWITCHGEAR with magne-blast power circuit breaker for station service. Shipped ready to install, complete with circuit breakers, interconnections, busses and interlocks—all in one package.



ISOLATED-PHASE BUS TO POWER TRANSFORMERS with throat-connected seal-off bushings are used at building wall to provide a weather-tight seal. Factory assembled units ensure ease of installation and provide maximum protection.



LOAD-CENTER UNIT for low voltage service. Entire assembly ordered and shipped as a factory-co-ordinated unit, ready to install. Air circuit breakers are draw-out type for easy testing and inspection.



METAL-ENCLOSED DUPLEX CONTROL BOARD provides centralized control and metering. Control and indicating equipment is mounted on front panels and recording, regulating and protective equipment on rear.

GENERAL ELECTRIC

855-30

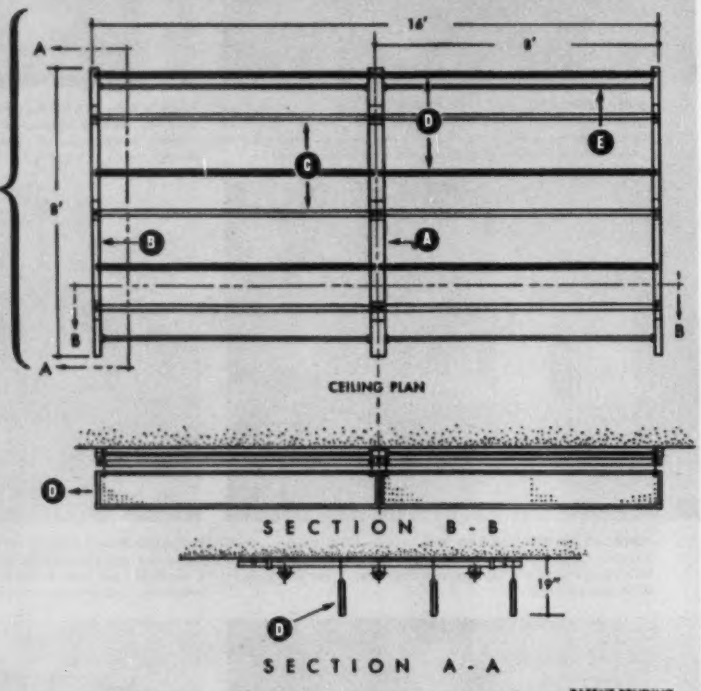
Here is a simplified, integral light and sound conditioning system *with amazingly low initial cost, installation cost, and maintenance cost!*

Ideal for schools, offices, auditoriums, stores and other commercial interiors.

This 8" x 12" x 96" packaged section, completely wired and assembled, expands to cover an area of 128 square feet as shown on ceiling plan at right. Sections may be mounted end to end and side by side to accommodate all room sizes.

- **A** Mogul CurtiStrip rolled steel channel houses ballasts, wiring, and supports high voltage lamp holders.
- **B** Smaller CurtiStrip rolled steel channel supports low voltage lamp holders.
- **C** 96", T-12, 72-watt Slimline lamps. May be operated at half-brightness or normal brightness.
- **D** 1' x 8' perforated acoustical panels (both sides perforated) in rolled steel frames.
- **E** Interconnecting lengths of ½-inch tubing. Spaces channels and encloses wiring.

Photograph shows the Curtis Light and Sound Conditioning System with portion of the panels installed. Hinsdale Township High School, Hinsdale, Illinois.



PATENT PENDING

A comprehensive bulletin completely illustrated is now on the press. Send for your FREE copy.

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Dept. C18-05, 6135 West 65th Street,
Chicago 38, Illinois

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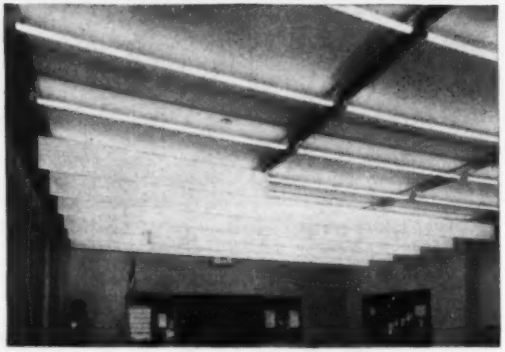
Company_____

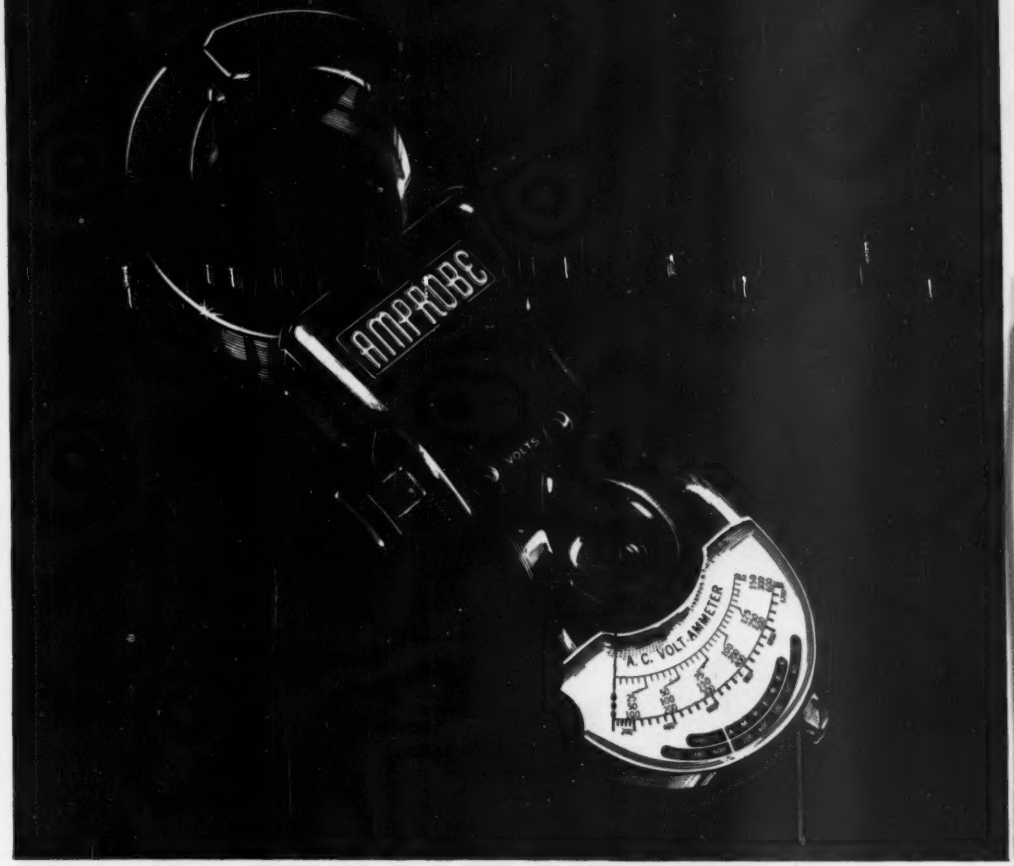
Address_____

City_____ State_____



CURTIS LIGHTING, INC. • Dept. C18-05 • 6135 West 65th Street • Chicago 38, Illinois

new 1200 amp. AMPROBE



Take the new Amprobe "1200" into your hand. Compare it with any other high-current volt-ammeter. You'll quickly recognize the advanced engineering and design that have gone into the "1200".

ELIMINATES ERRORS: Exclusive doughnut-type transformer eliminates for all practical purposes the factor of error due to position of conductor. COVERS NINE RANGES: 0-15/60/150/300/600/1200 (yes, 1200) amps AC, 0-150/300/600 volts. SAFER: Probe jaws insulated right down to the sockets. Voltage test lead plug automatically insulates itself when removed from meter. MORE CONVENIENT: So compact, carry it in your pocket!

Only $67.50, with leather case and leads. Also Amprobe "600", up to 600 amps, $59.50. Pyramid Instrument Corp., Lynbrook, New York.
(Export Division: 458 Broadway, New York City. Cable: Morhanex).

AMPROBE®

the only pocket-size snap-around volt-ammeter

WRITE TODAY: Dept. EW32

Pyramid Instrument Corp.
Lynbrook, New York

☐ *Send Bulletin No. 128, describing new Amprobe Models "1200" and "600".*

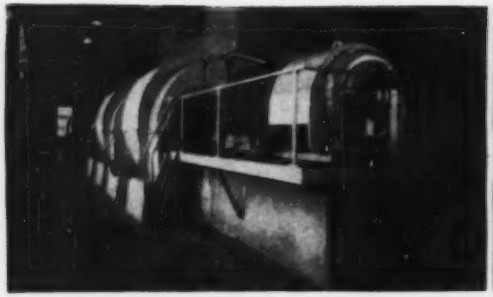
☐ *Send 16-page manual of time-saving uses: "Servicing with the Amprobe".*

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

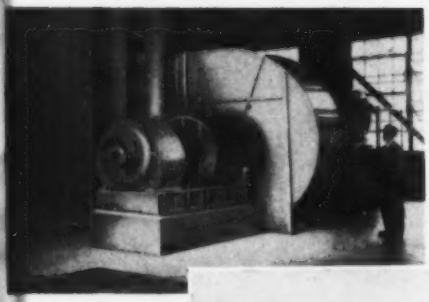


"Buffalo" INDUCED DRAFT FANS are known for their ability to stand punishment and to deliver efficiently.

"Buffalo" CINDER ELIMINATING FANS offer power plants induced draft and cleaning, all in one compact unit.

You'll Make the BEST CHOICE of DRAFT FANS

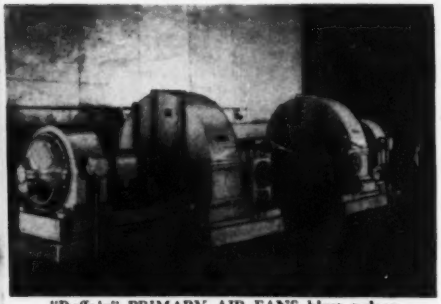
from this COMPLETE LINE



"Buffalo" FORCED DRAFT FANS give stable performance even when fuel bed is unusually heavy.

"Buffalo" COMBINATION DRAFT FANS are compact forced and induced draft fans with a common rotor shaft.

You can pick the best possible draft fan for the particular job because "Buffalo", pioneer manufacturer in the field, has developed a special fan for each job. Besides the fans illustrated here, "Buffalo" builds Sintering Fans; high-pressure Scavenging Blowers for Diesel-electric power plants; Over-fire blowers; and Industrial Exhausters for smaller induced draft installations. Why not investigate the construction and performance details that make "Buffalo" Fans the first choice for many of the country's leading power stations and plants? Write for Bulletin 3750 today, and look over this COMPLETE choice!



"Buffalo" PRIMARY AIR FANS blast pulverized coal and hot air into combustion chambers without letup.

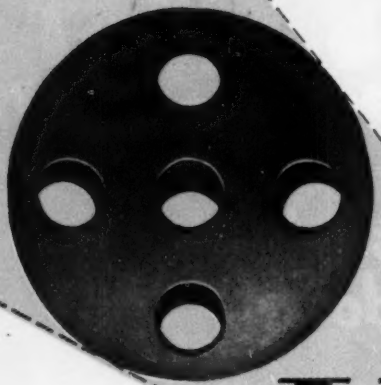
"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

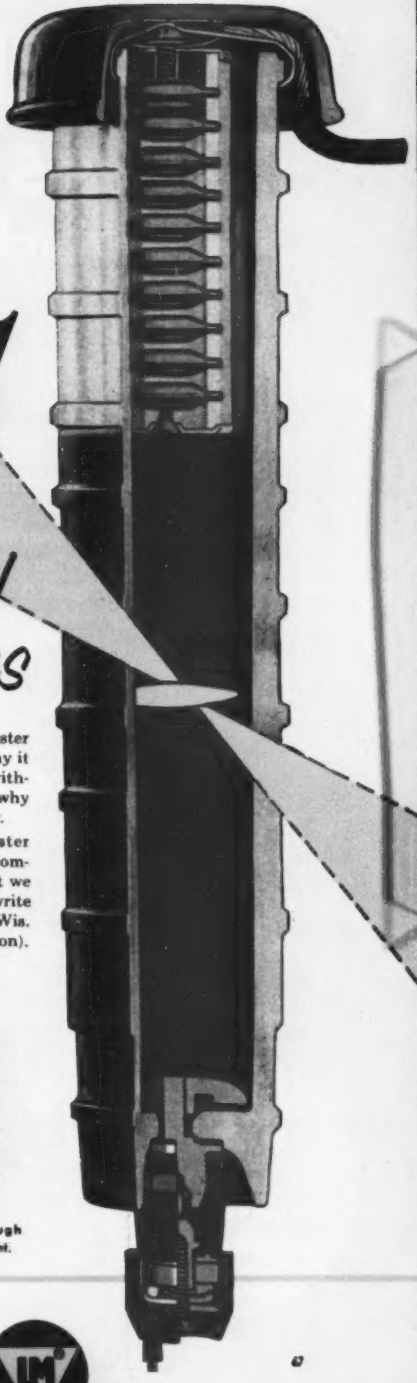
212 MORTIMER ST. BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING



the only lightning arrester with the LENS that gives it such high discharge capacity and unchanging characteristics



An ingeniously designed lens electrode is placed in the valve element of *every* L-M valve type arrester. This exclusive L-M feature performs an extremely valuable function that accounts for the exceptional performance and long life of L-M arresters.

Here's why. Lightning surge current tends to "skin" down the outside of the valve element, just as 60-cycle current will flow on the skin of a conductor. This results in only a small portion of the valve element being used to handle lightning surges. Thus the surge capacity of what might be a good arrester is materially lowered—the valve element will fail in time due to the excessive concentration of current on the outer skin.

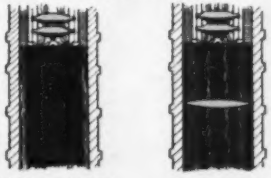
The L-M lens electrode completely counteracts lightning surge current "skin effect." The full cross-section of the valve element is available for extremely high surges—considerably in excess of 65,000 amperes.

The lens does the job. It distributes the surge evenly throughout the valve element—doesn't allow it to concentrate in any one path and thus clinker the element.

That's one reason why an L-M arrester can take more and heavier surges—why it maintains its high discharge capacity without change, for years and years . . . why its rate of failure is so gratifyingly low.

Get the whole story on L-M arrester performance, including some utility company records which substantiate what we say. Ask the L-M Field Engineer, or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

Here's What Happens



Without LENS
Surge channels down sides of element.

With LENS
Surge goes through the entire element.

LINE MATERIAL
Lightning Arresters

Complete Coordinated Equipment for Distribution Today

THE INDUSTRY'S FIRST STANDARDIZED "FAMILY"

of 5 KV Cutouts with interchangeable doors!

50 and 100 ampere cutouts, each with

new PND standard duty non-indicating doors

PVD standard duty indicating doors

PHD heavy duty non-indicating doors

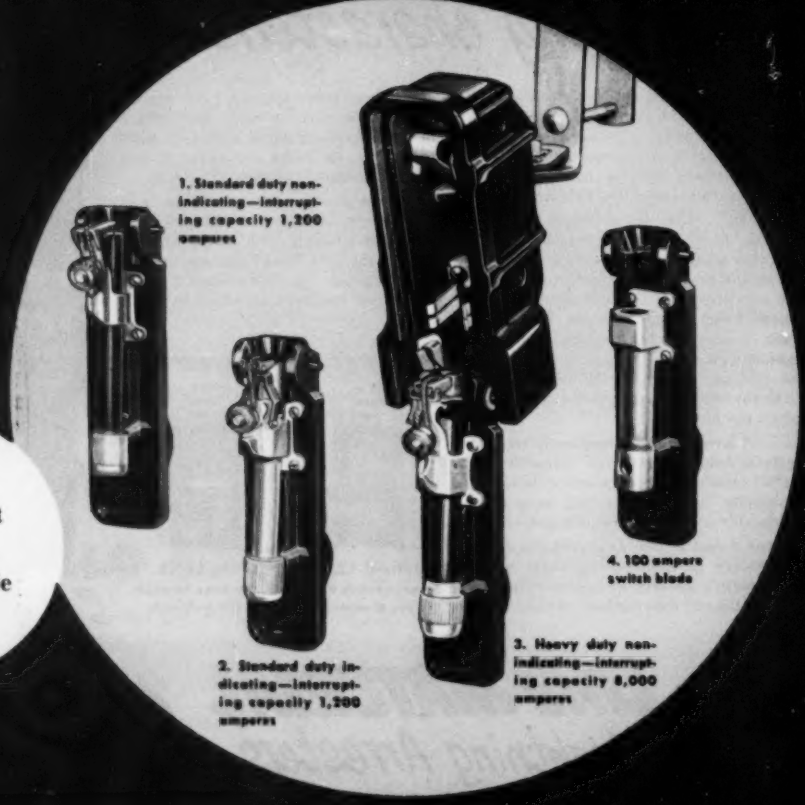
100 and 200 ampere switch blade doors

L-M, leading manufacturer of distribution cutouts, presents the first fuse cutout family offering complete interchangeability. 50 and 100 ampere boxes are offered, each taking care of four types of services.

Now—buy one box, with the doors you need for your present services. As operating requirements change, simply unhook the present door and hook on a new one. It's a 6-second job!

This new family saves space, time, and money in warehousing, installation, and operation. Safer, too! The lineman can remove the door completely, re-fuse, and replace it, all with the *switch stick*. When door is open, all door parts are dead.

Get the Whole Story. Ask the L-M Field Engineer; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).


1. Standard duty non-indicating—interrupting capacity 1,200 amperes
2. Standard duty indicating—interrupting capacity 1,200 amperes
3. Heavy duty non-indicating—interrupting capacity 8,000 amperes
4. 100 ampere switch blade

50
ampere cutout with four interchangeable doors

L-M's New 5 kv "first family"

RATING	INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES RMS AMPERES 2.5 kv	5 kv
50 AMPERES	1. "PND" standard duty, non-indicating	1,200 amperes	1,200 amperes
	2. "PVD" standard duty, indicating	1,200	1,200
	3. "PHD" heavy duty, non-indicating	8,000	5,000
	4. Switch Blade	100 amperes continuous current rating	
100 AMPERES	5. "PND" standard duty, non-indicating	3,000	3,000
	6. "PVD" standard duty, indicating	3,000	3,000
	7. "PHD" heavy duty, non-indicating	14,000	10,000
	8. Switch Blade	200 amperes continuous current rating	

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"PVD," "PND," and "PHD" are L-M trademarks.

LINE MATERIAL

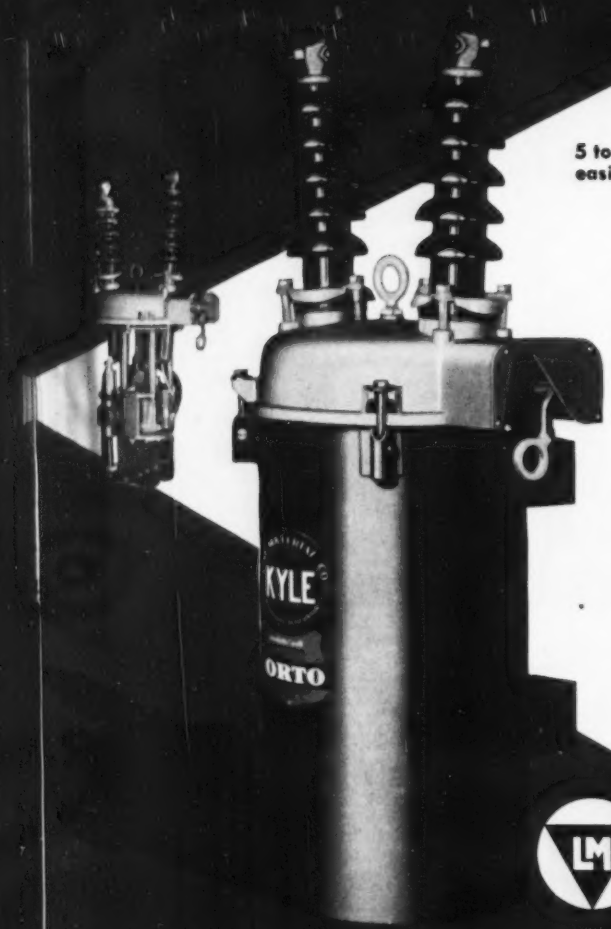
fuse cutouts

Complete Coordinated Equipment for Distribution Today

Also in 7.5 kv sizes

A 7.5 kv family is also available, with 50 and 100 ampere cutouts, each with four interchangeable doors. Doors can be bought separately.

NEW KYLE 23 KV



Interrupting capacity 1500 amperes at 23 kv

150 kv basic impulse level

Cross-blast arc extinction

5 to 100 ampere ratings; rating rapidly and easily changed in the field

L-M's new KYLE type E recloser is specially designed for 23 kv service. The type E has exceptionally strong construction, with large contacts of finest arc-resisting material. The oil cross-blast feature insures very rapid extinction of the arc.

The recloser provides ample protection for circuits with loads up to 100 amperes and fault currents up to 1500 amperes. It is extremely accurate, with dependable hydraulic timing proved by years of field experience. In fact, well over half the reclosers in service today are Kyles! Type E's will coordinate with one another as well as with fuses on branch circuits.

The unit provides up to three successive reclosures plus final opening to lockout. Choice of three operating curves, seven operating sequences. Has all the Kyle safety features. Built-in coil protection. Radio noise-free. Meets applicable AIEE and NEMA standards or proposed standards, and is REA-accepted. Filled with ORTO®, L-M's inhibited oxidation-resistant transformer oil, for longer life.

Get the Whole Story

Ask the L-M Field Engineer to tell you all about this new Kyle type E recloser; or write for copy of bulletin to Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

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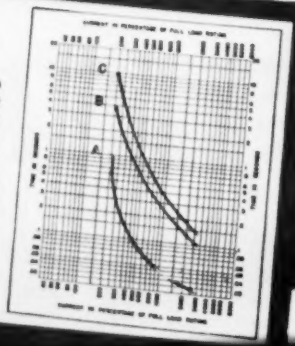
LM®

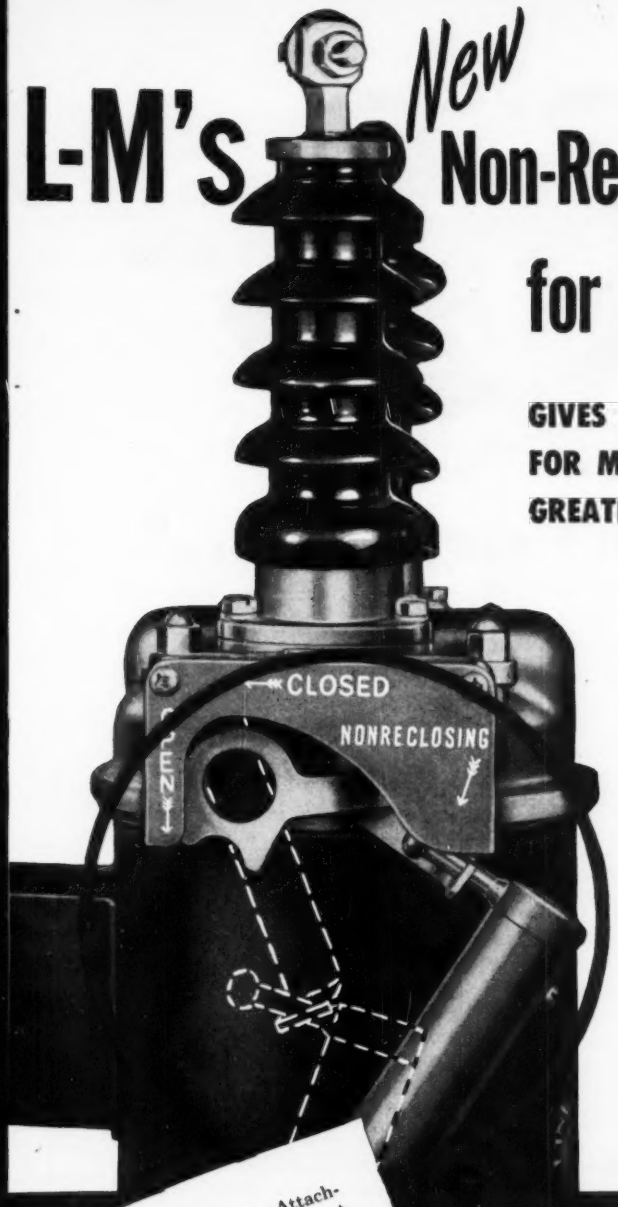
LINE MATERIAL

Choice of Seven Sequences

Kyles are the only reclosers offering choice of at least three time-current curves and seven tripping sequences. Curve A, fast; curve B, retarded; curve C, extra retarded. Sequences quickly and easily changed in the field by changing one or two small parts. No extra shop trips!



L-M's *New* Non-Reclosing Attachment for Kyle® Reclosers



GIVES GREATER SAFETY FOR MEN AND EQUIPMENT... GREATER SAFETY IN HOT LINE WORK

L-M's new Non-Reclosing Attachment provides lockout of the recloser on the first fast operation. Should an accidental contact or arc occur while men are working on the line, the recloser opens instantly and stays open, instead of continuing through the usual complete four-operation sequence.

This new attachment provides the same protection out on the line that has been available only on substation breakers. It permits hot line work with far greater safety to men and equipment. The attachment is available at a small extra cost on all Kyle reclosers.

For complete information ask the L-M Field Engineer or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

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The Non-Reclosing Attachment lever is under the sleet hood next to the regular reset handle. Pulling down the lever puts the attachment into operation but *does not* open the line. When work is completed the lever is pushed back up—and the recloser will then operate normally.

LM®

LINE MATERIAL

"They didn't stay sold . . ."

There they were . . . forty-four of them . . . sleek, trim hair dryers . . . styled by a nationally famous designer . . . full of eye-appeal and buy-appeal . . . but every last one was going back to the manufacturer. Why? — because they didn't stay sold. Out of the five original sales, four were already back. Irate customers had brought them in . . . they had worked for awhile and then shorted out . . . investigation showed that the electrical insulation wouldn't stand the heat. The Electric Sales Company couldn't take chances on future customer good-will with merchandise like that . . . and it would be a long time before that particular manufacturer got another order from them.

Whether you make home appliances, radio or electronic equipment, or industrial machinery, you need the extra protection of BH Fiberglas Insulations to guard against insulation failure, product breakdown, loss of customer good-will.

Take BH Special Treated Fiberglas Sleeving, for example. Here is a high heat insulation with remarkable resistance to sub-zero temperatures as well.

Dielectric and physical properties remain unchanged through a temperature range of −67°F. to 1200°F. BH Special Treated is permanently flexible, there are no impregnants or coatings to age or harden. But it is not completely limp. A patented heat process gives the sleeving body and rounds it . . . crimps crossing strands to prevent raveling and minimize fraying. It will not ravel when cut in short lengths, or when spread to cover knobs, terminals and irregular objects. Installation time is speeded.

BH Special Treated Fiberglas Sleeving is one of a family of electrical insulations, each designed to meet particular conditions in service. Give us a few facts about your requirements – product, temperatures, voltages—we will gladly furnish samples for testing purposes.

Address Dept. W-3

Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

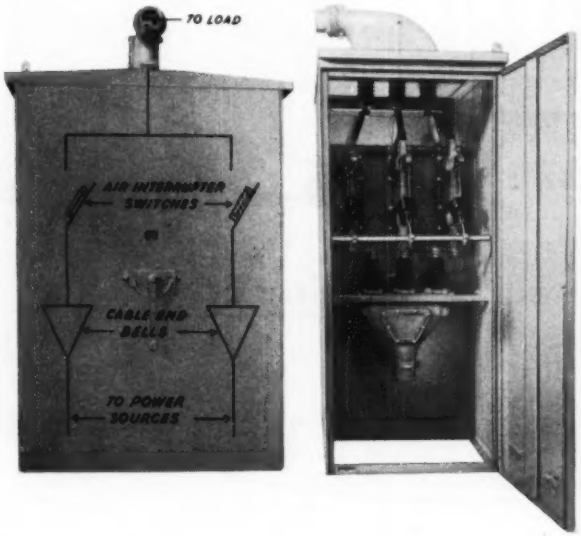
BH *Fiberglas** SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

A MULTIPLE DUTY DEVICE

"Three E" Air Interrupter Switch not only provides a visible gap for isolation of apparatus, but more important, interrupting capacity to 600 amperes at 15000 volts.

Interrupting units are neat and compact, confining the arc, and using self generated gas blasts to extinguish the arc. No oil or other inflammable liquids are used.



SAFE

RELIABLE

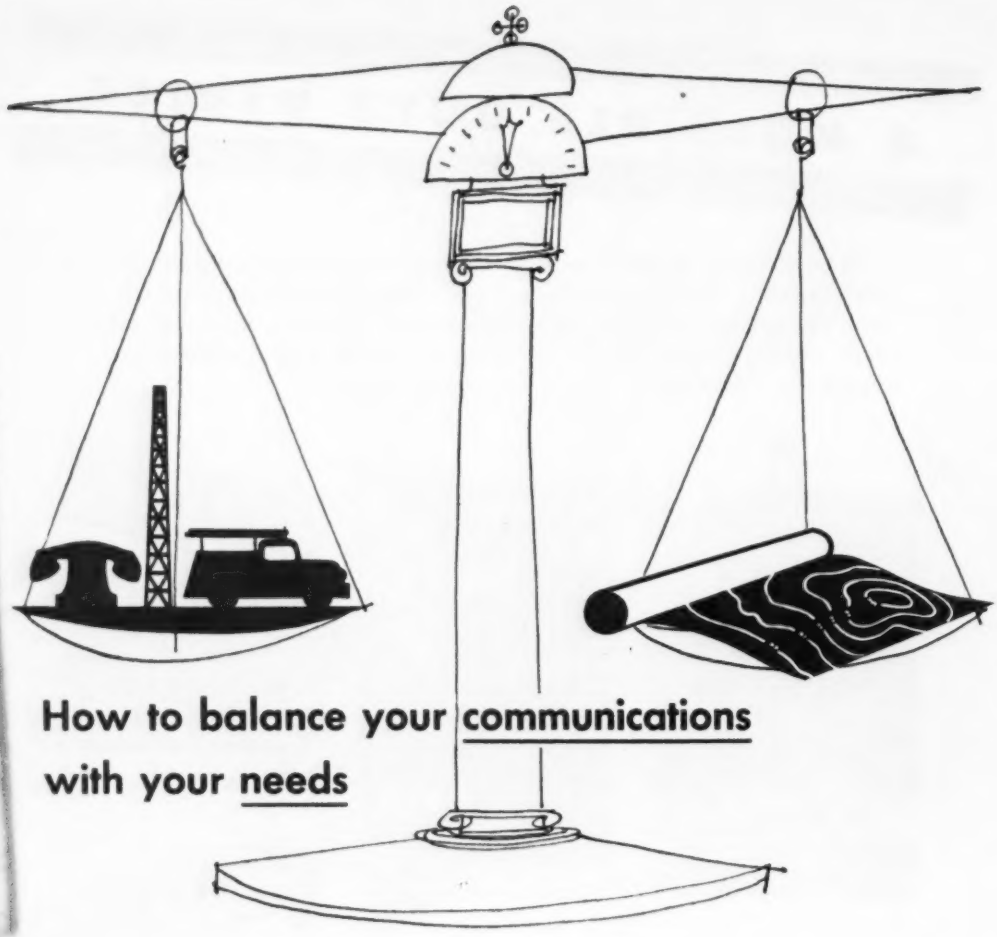
ECONOMICAL

Two three pole single throw 400 ampere 15KV Air Interrupter Switches in outdoor metal enclosure serving important pumping load from two sources of power. Interlocked so one switch must open before other is closed. Power entrances and load exit through cable end bells. Illustration shows barriers removed.

Ideal for control of station auxiliary equipment, in customer's vaults, at load centers, etc. Can be supplied with connecting throat for mounting onto transformer or switchgear.

Consult your nearest Three E representative or write us for information as to how the Three E Interrupter Switch can be applied to your switchgear requirements.

THREE E — ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS



How to balance your communications with your needs

Every power line has its own individual communications requirement. Any less is unsatisfactory. Any more is wasteful.

The Bell System can provide exact amounts of communications service — *no less*, and *no more* than you should have. If your communications needs increase, we can expand your service accordingly. If your needs decrease, we can trim your service to fit.

Net result: *good*, *flexible*, efficient communications for the job at all times.

The Bell System places all forms of communications at your service — using microwave radio, wire or cable. In every case, we have matchless experience to back up our equipment.

•

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

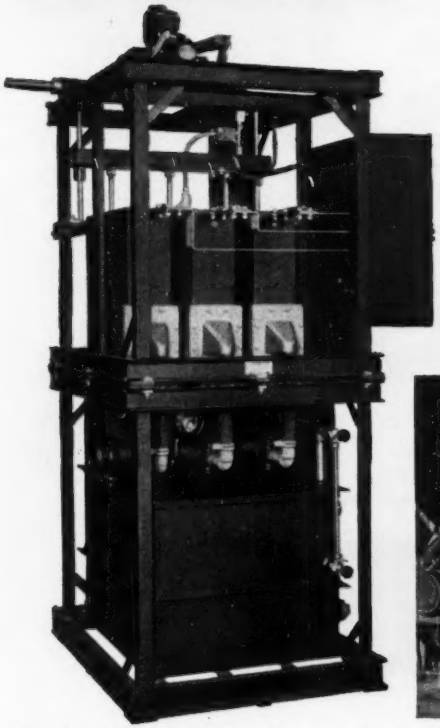
METERING CHANNELS

BELL TELEPHONE SYSTEM

ALLIS-CHALMERS
Liquid Rheostat
POWER PLANT CONTROL

Stepless Speed Control

OF DIRECT COUPLED DRAFT FANS



Speed of the direct coupled forced draft fans shown at right is controlled by remotely located Type 257 Liquid Rheostats.

FOR PROPER DRAFT CONTROL of boilers, use Allis-Chalmers Type 257 Liquid Rheostats in the secondary of wound rotor motors driving forced or induced draft fans.

Stepless speed control of Type 257 Liquid Rheostats is engineered to give straight line relationship between motor speed and rheostat electrode position. Equal sensitivity of speed control over the entire regulated range is assured.

Floor space is saved by compact design. Only electrical connections are required. Direct coupling of fans and driving motors simplifies bearing alignment and maintenance problems . . . saves space . . . insures continuity of service.

Low Maintenance. Type 257 Liquid Rheostats have but few moving parts . . . no arcing contacts. Electrodes can be actuated by electric, pneumatic or hydraulic operators and give full resistance range in approximately ten inches travel.

Call your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin for leaflet 14S7544. A-3423

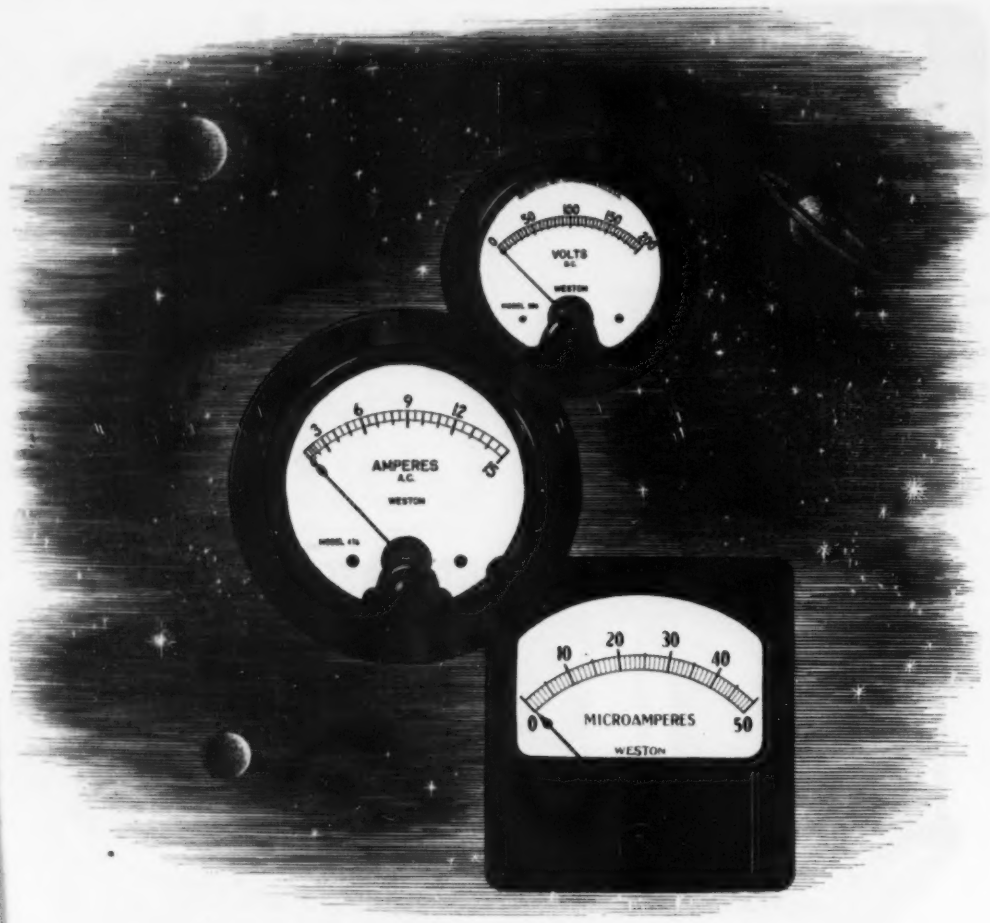
ALLIS-CHALMERS

WOUND ROTOR PRIMARY MOTOR CONTROL

Make your Boiler Draft Fan Drive all Allis-Chalmers. Use the Type 257 Liquid Rheostat for secondary speed control, an Allis-Chalmers Type "H" Starter for primary control (bul. 14B6410A), and an Allis-Chalmers wound rotor motor.

ORDER TELEGRAPH SYSTEMS

The Allis-Chalmers Order Telegraph System is accurate and reliable . . . can be depended upon even during station power failure because it uses the dc bus for its power source. An alarm system operates until the order is returned correctly. Select either five or ten-inch semi-flush dials. Use it to transmit orders between switchboard and turbine room.



Among the things you take for granted...

The strong conviction instrument users hold for *measurements by* WESTON has its foundation in their own instrument experience . . . years during which WESTON instruments have given unfailing service . . . proved beyond doubt their unequalled precision, stamina and dependability. It is evident in the widespread preference shown for WESTON instruments for panel and built-in needs . . . where *so much* depends on the movement of a pointer. Regardless of the service . . . or the type, range or sensitivity of the instrument . . . truthful measurements and long, carefree service are *taken for granted*. Copy of panel instrument bulletin A7C gladly sent on request. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAGliabue instruments.

WESTON *Instruments*

ONE Nichrome*

"One World." All over the globe, men have come to acknowledge this unique concept as the most effective basis for solving innumerable problems related to human progress.

"One Nichrome." All over the globe, men have come to acknowledge this unique alloy as the most effective means for solving a host of problems also related to human progress—in the fields of engineering and production.

This being so, we take particular pride in our trademark: NICHROME—granted solely and wholly to us by the United States Patent Office forty-three years ago. Representing a series of superb electrical heating and resistance alloys, developed and produced *only* by Driver-Harris, it symbolizes top quality and utmost dependability to manufacturers everywhere.

*T. M. Registered in United States Patent Office by Driver-Harris Company August, 1908

World-Famous **Nichrome*** is produced only by

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

Manufactured and sold in Canada by The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

Factories: U. S. A., CANADA, ENGLAND, IRELAND, FRANCE, ITALY, SPAIN Representatives in 38 COUNTRIES

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

No. 5- side-opening . . .

★ *Hi-Voltage Type D Gang-Operated Disconnecting Switches are for substation work, primarily where hook-operated switches would be inaccessible. They are available in capacities from 400 to 1200 amperes, 7,500 to 161,000 volts.**

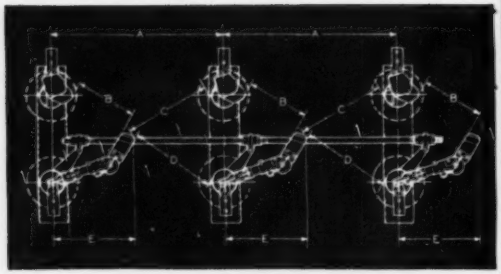
Certain operation anytime...under any conditions...even after years of standing idle is your guarantee with Hi-Voltage Switches. One of the chief features that assures this outstanding service is the blade-and-contact construction.

Endurance tests in the laboratory . . . totalling over 100,000 operations . . . have shown no appreciable wear of Hi-Voltage contacts. We have never received an order for replacement contact parts. They don't wear out . . . they don't overheat . . . they don't need adjustment . . . they don't need cleaning.

The contacts are line-type and are silver-nickel, welded to copper, combining low resistance with low friction. Stainless-steel springs maintain maximum conductivity. Operating effort is applied directly to the switch arm. The entire switch is engineered to eliminate failure and wear.

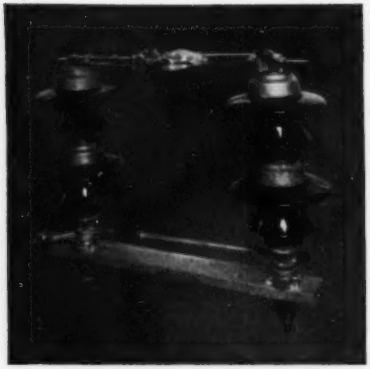
Ask your Joslyn Representative to show you more money-saving advantages of Hi-Voltage Switches.

**Type D switches are made for either right or left-hand opening and for upright, vertical or under-hung mounting.*



Open Position Clearances

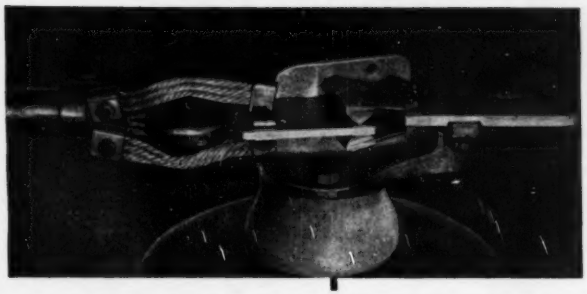
Voltage	A Minimum Phase Spacing	DIMENSIONS IN INCHES B	C	D	E
7,500	2'-6"	12	15	14	15
15,000	2'-6"	12	15	14	15
23,000	3'-0"	15	19	17	18
34,500	4'-0"	23	26	23	23
46,000	5'-0"	30	33	29	29
69,000	6'-0"	35	36	38	36
115,000	10'-0"	53	68	70	52
161,000	14'-0"	78	98	99	73



This center-break switch is used where phase spacing is unusually close or where clearances to bus work or the structure require a horizontal break switch.

HI-VOLTAGE

type D gang-operated switches

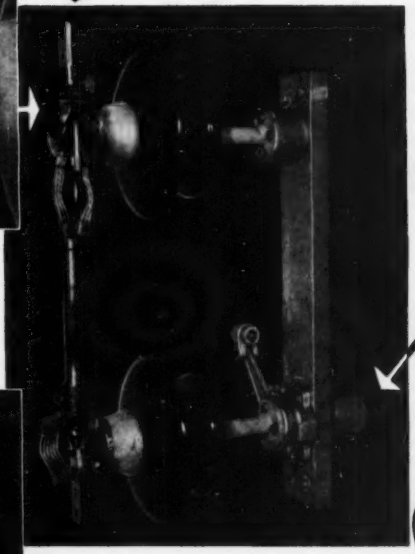


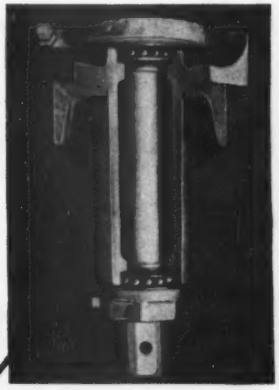
For description of this blade-and-contact construction, see opposite page.

Hi-Voltage SWITCHES ARE AVAILABLE

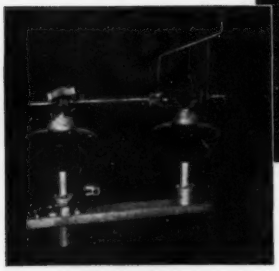
from 200 to 3000 Amperes, 7500 to 161,000 Volts for upright, underhung or vertical mounting.

CONTACT HOUSING protects against sleet, dirt and arcing. Also, it acts as an ice breaker.





MAIN BEARING carrying rotating insulator is a forged steel spindle mounted in monel ball bearings and stainless steel races. Never requires lubrication.



ARCING HORNS are available for upright Type D Switches.

ALSO AVAILABLE!

Grounding Switches
Manual and Automatic Control Mechanisms
Mechanical Interlocks
Hi-Voltage Fuses
Cross-arms and Mounting Frames
And all customary accessories

EQUIPMENT COMPANY

4000 EAST 116th STREET • CLEVELAND 5, OHIO

Profitable Load for Tomorrow Belongs to Those Who Prepare For It TODAY!

GUNS and BUTTER... *Then What?*

In the days ahead, when we have returned to a more normal civilian economy, the **electric** utility industry will be faced with a vigorous reactivation of its job to bring all-electric living to reality across the nation. Hotpoint, with a tradition of close cooperation and an understanding of utility problems, has taken the lead in effecting a transition which gradually but surely is bringing this objective nearer achievement.

Because of its aggressive promotion in bringing today's low-saturation and **load-balancing** appliances nearer the demand stage . . . its pioneering and leadership in the promotion of all-electric kitchens and home laundries . . . the resounding acceptance it has developed for its **full family** of appliances, Hotpoint is maintaining an upsurging demand by homemakers for **all the electrical** servants that make up the modern electric home of today and for tomorrow.

As the obstacles to an unrestricted domestic economy are removed, Hotpoint will have the way open for still greater utilization of domestic electrical load through avenues of profitable **load-balancing.** Hotpoint's Utility Division is at the service of any utility company desiring assistance in developing **load-building** or **load-balancing** programs for today or tomorrow.

Hotpoint

(A General Electric Affiliate)

5600 West Taylor Street • Chicago 44, Illinois

Here's Proof of Performance...

ERECTED IN 1914, THESE POLES ARE PROTECTED BY

CREOSOTE OIL

● Protected by Creosote Oil, these pine poles have stood for 38 years and are still in good condition. They are owned by New York Telephone Company, and are located along Arthur Kill Road, Staten Island.

A recent inspection showed these poles will be in good condition for many years to come.

You'll find that wood treated with Creosote Oil consistently turns in outstanding records of service. No other preservative can match its proved effectiveness.

Creosote Oil contains not only one but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

For best results from Creosote Oil treatment, specify U·S·S Creosote Oil. It's uniform in quality—the product of continuous processing in the world's largest tar distillation plant: there's no chance for batch-to-batch variation. For more information, contact our nearest sales office or write directly to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

U·S·S CREOSOTE OIL

USS

UNITED STATES STEEL

By dehydrating insulating oil at low temperatures by De Laval centrifugal machines, oil is produced that is safer to use than that derived by methods requiring relatively high heat to drive off the moisture.

De Laval low temperature purification prevents rapid reduction in dielectric strength of the oil after purification. Another advantage of low temperature purification by these centrifugals is that the probability of condensate forming in the receiving tank is eliminated.

De Laval Insulating Oil Purifiers are equipped with low-watt-density electric heaters which prevent carbonization of the oil. Heating losses are kept to a minimum.

De Laval centrifugals dehydrate insulating oil in a single pass. Because they discharge water continuously, they prevent any possible recontamination of the oil.

● *Send for Bulletin TR-1*

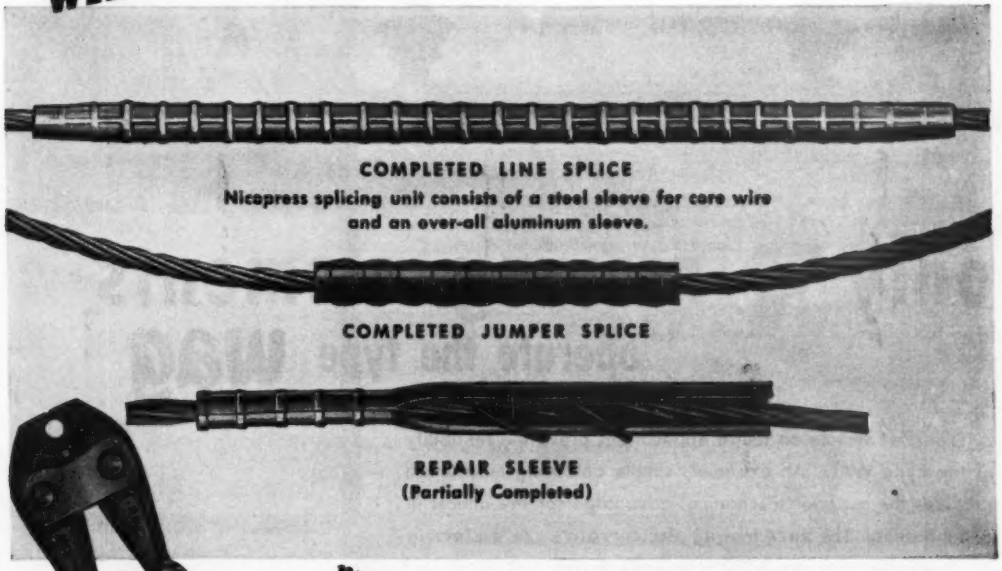
DE LAVAL

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

INSULATING OIL PURIFIERS

Nicopress SLEEVES for A·C·S·R·

WILL GIVE YOU PEAK PERFORMANCE!



COMPLETED LINE SPLICE

Nicopress splicing unit consists of a steel sleeve for core wire and an over-all aluminum sleeve.

COMPLETED JUMPER SPLICE

REPAIR SLEEVE
(Partially Completed)

Nicopress is the Registered Trade Mark of The National Telephone Supply Company

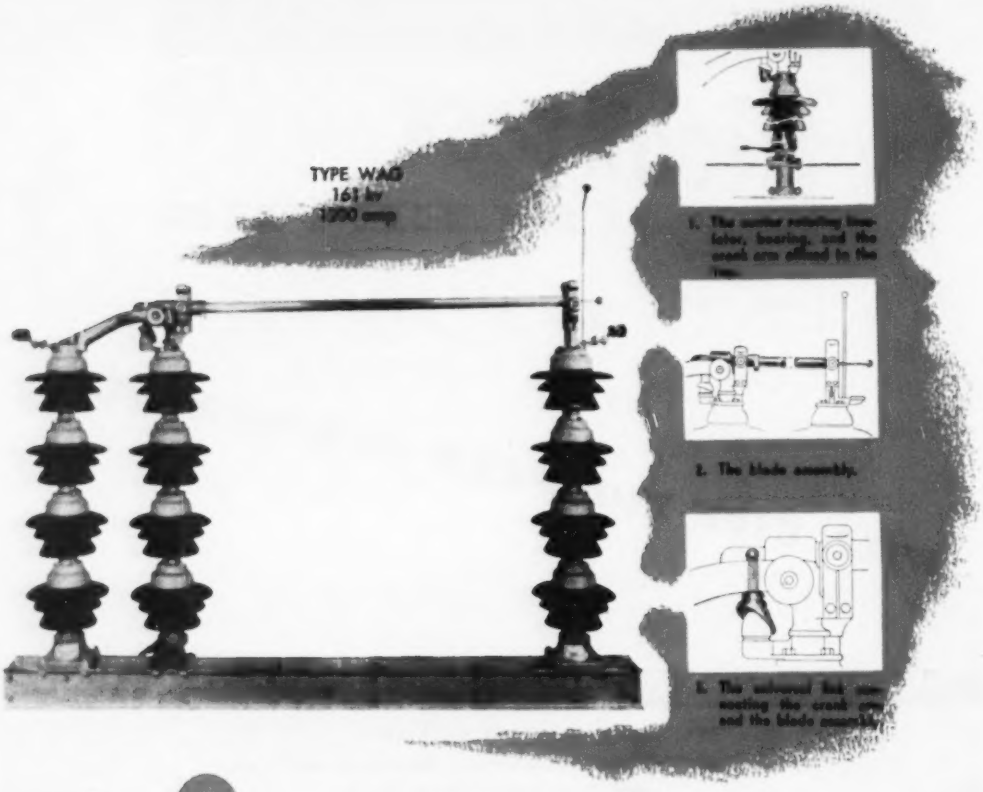
The National Telephone Supply Company

5709 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY



only 3 moving elements operate the type WAG

Years of service on tough applications prove the reliability of the Type WAG. An extremely simple operating mechanism provides the superior mechanical advantage for the utmost in dependability. The three moving elements are set in the factory . . . precluding the possibility of maladjustment.

Positive blade control, freedom from maintenance and minimum linkage add to the outstanding performance and overall economy of the Type WAG.

Write today for Bulletin 390-R for complete information about the Type WAG.

Southern States Equipment Corp.
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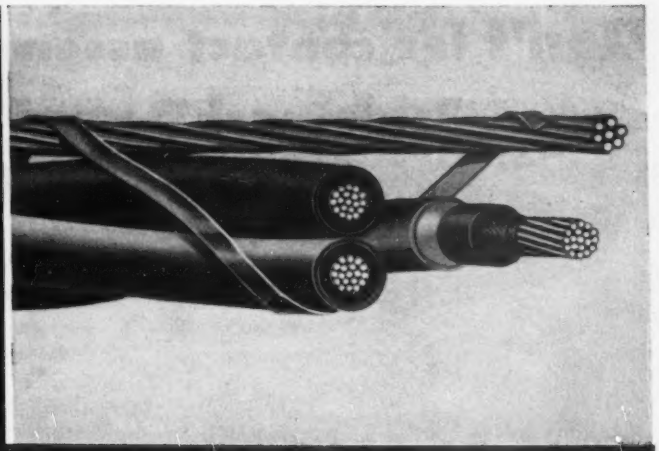

Durable neoprene jacket protects aerial cable . . . assures long service

Today, neoprene-jacketed, self-supporting aerial cable is first choice for primary distribution lines. Neoprene's outstanding resistance to deterioration from sunlight, weathering, and abrasion means maximum protection to insulation . . . long service without failure.

In rural, residential, and industrial areas alike, neoprene-jacketed aerial cables have continued to operate despite long exposure to conditions which would normally cause "outages". . . such as the corrosive action of industrial smoke and fumes and abrasion by tree limbs. Ask your supplier about neoprene-jacketed aerial cable. It's available pre-assembled with built-in messenger or in individual cable lengths for "spinning" on the job.

Send for "The Neoprene Notebook." Each issue describes new, unusual applications of neoprene. Write today to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div., Wilmington 98, Delaware.

NEOPRENE

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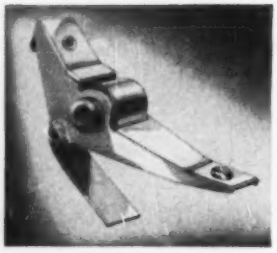
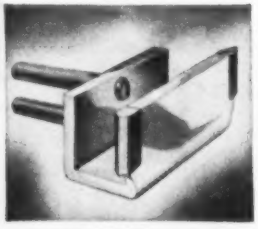
150th Anniversary

Tune in Du Pont "Cavalcade of America"—Tuesday evenings, NBC—coast to coast

Don't let contact assembly problems "sidetrack" your engineers... your production facilities!





No manufacturer today can afford to waste either man hours or machine time. He must plan his operations so that both work full time at the jobs they can do best—their regular jobs.

You can avoid diverting men and machines from your own specialty by turning to Mallory for improved design and the production of contact assemblies—a job for which Mallory has the necessary specialized skills, materials and tools.

For 25 years, Mallory has been designing and producing contacts . . . has built an unequalled store of experience . . . developed special alloys, special techniques and special tools to turn out all kinds of contact assemblies.

These assemblies pay off for Mallory customers in the form of outstanding performance on the job—often at reduced costs. In addition, when you put Mallory to work for you, you completely eliminate the problems of scheduling, inventory control, other overhead costs and divided responsibility involved in handling your own contact unit production.

Call or write Mallory today. You'll find, as many other manufacturers have, that it really pays in many ways to count on Mallory for all your contact assembly needs.

●● *Shown here are examples of Mallory contact assembly design and production. Each represents a practical, economical answer to specific problems of conductivity . . . necessary physical strength . . . secure bonding of contact to backing material. You can count on the same kind of satisfactory answer to all your contact assembly problems when you put Mallory's specialized knowledge, techniques and materials to work for you.*

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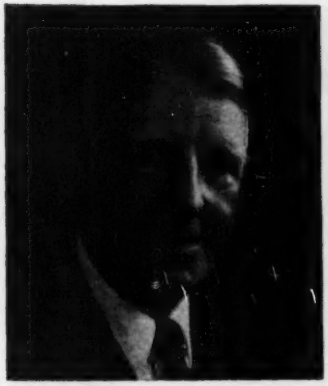
Men who design, engineer and buy America's products rely on..and use..National Laminated Plastics because..

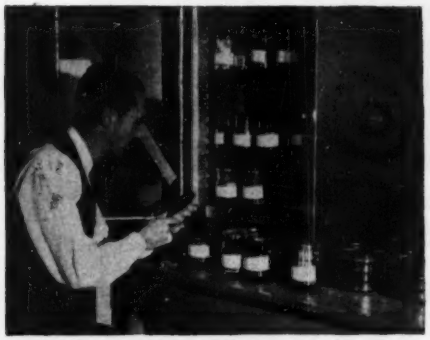


"At National, engineering research is of prime importance. We believe only through it and by large investment in it are we able to: *first*, provide industry with dependable laminated plastics for the efficient production of today's products which were developed yesterday; *second*, give practical assistance to the design engineer who is creating today, new, better products for tomorrow."

J. Warren Marshall, **President**
National Vulcanized Fibre Co.

At the Proving Grounds

Here is the Phenolite Pilot Plant—coating machine and press in miniature—where under exact commercial production conditions, testing and experimental work are conducted on thermo-setting products requiring special resins or base materials. This is representative of the research engineering facilities National provides in which over a million dollars are invested.



Stiegler's Fungus House

Frederick L. Stiegler directed the pioneering research that came up with a fungus-resistant vulcanized fibre, satisfactory for extended exposure to moist, warm air. This new grade of National Vulcanized Fibre has important use in refrigerators and products that must perform in fungus-generating climates.

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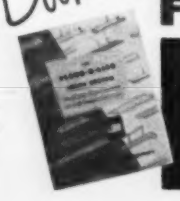
THESE 4 ADVANTAGES ASSURE *Lighting Satisfaction* WHEN YOU SPECIFY FLEUR-O-LIER

Free Booklet

Write for your free copy of the new booklet giving complete details of the Fleur-O-Lier Index System.



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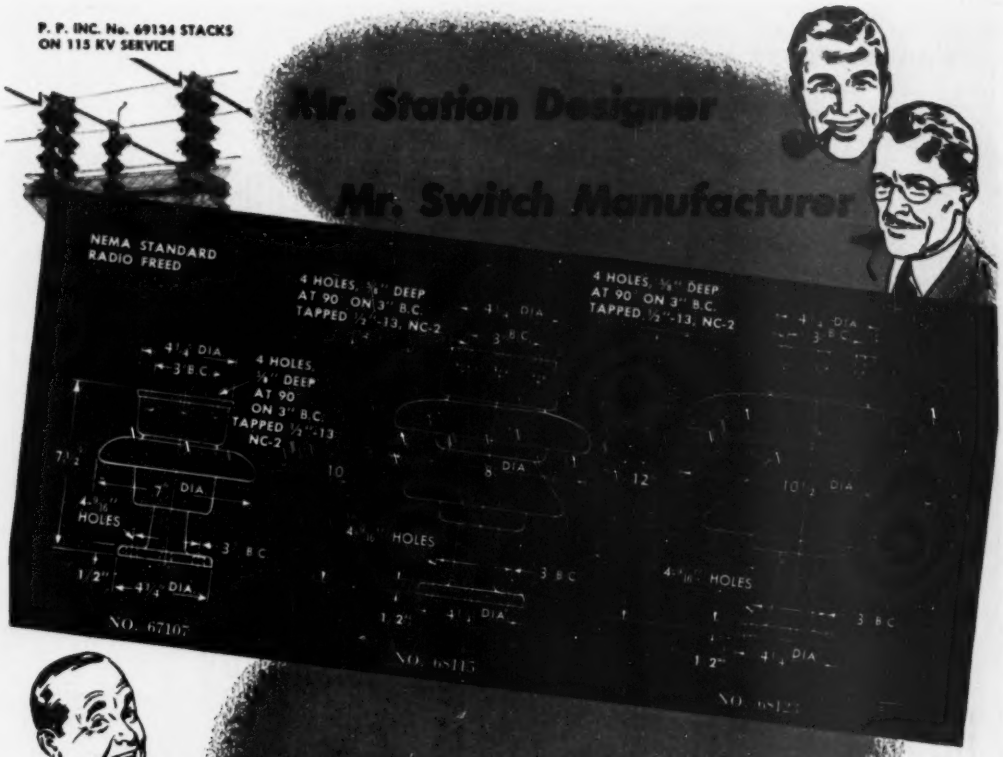
Fleur-O-Lier is not the name of an individual manufacturer but of a group of fixtures made by leading manufacturers. Participation in the Fleur-O-Lier program is open to any manufacturer who complies with Fleur-O-Lier requirements.



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if we depended on your replacing these rugged insulators!

Because—we build your Switch and Bus Insulators to last forever. We don't expect replacement business but look for your next business.

Finest Wet-process Porcelain—quality controlled, standard designs, expertly assembled, assure long life.

Dimensionally Standard Hardware Components—assure interchangeability—double hot-dip galvanized means low maintenance cost for you—precision jig assembled saves mounting time.

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Exhaustive Routine Tests—Each shell and every insulator is tested in excess of AIEE-NEMA standards—your safety assured.

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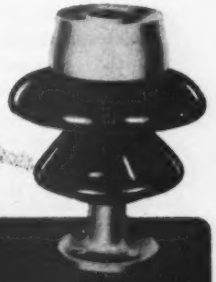

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Porcelain Products, Inc.

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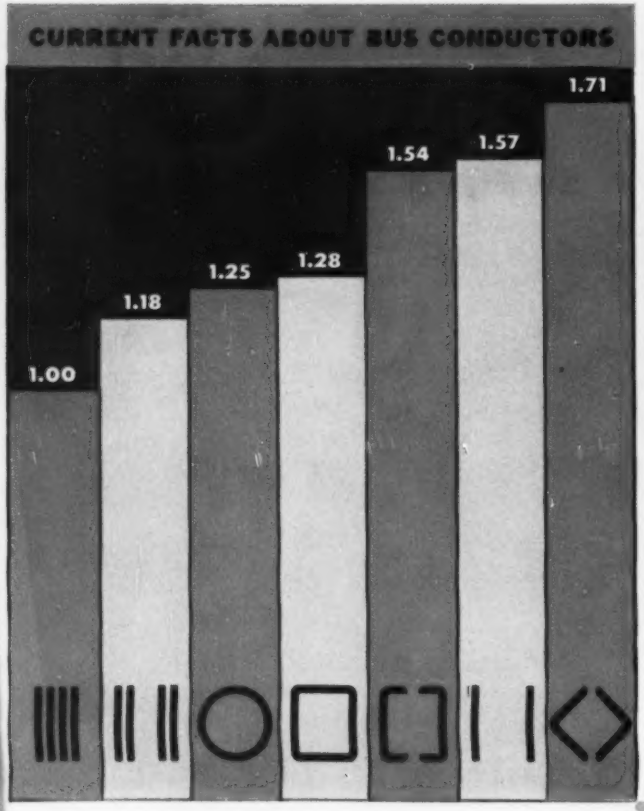

Proper bus design and arrangement increase current ratings

Shown here is a diagram of comparative ratings of various ANACONDA Bus Conductor arrangements. Each has a cross-sectional area of 4 square inches of high-conductivity copper.

Notice how the different designs and arrangements increase the current ratings. Here is another example of how ANACONDA Bus Conductors fit practically any job imaginable.

There is a complete line of ANACONDA Copper Bus Conductor designs for every type of installation and power requirement, including flat bars, round tubes, channel square busses, angle square busses, square tubes and cable conductors.
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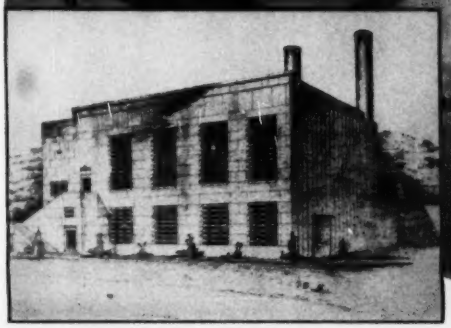
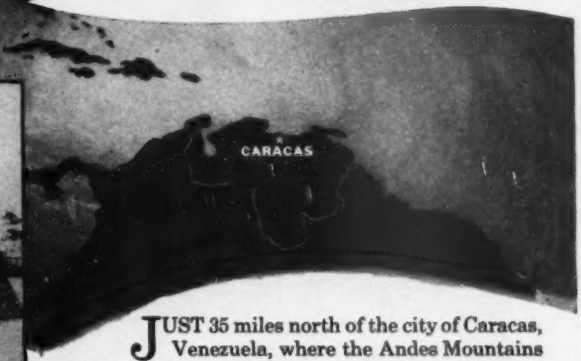
Write today for latest revised edition of the illustrated book, "ANACONDA Copper Bus Conductors." It contains a wealth of information about new designs and arrangements for bus conductors. It may help you solve your bus design problems.

carry the load with ANACONDA® bus conductors

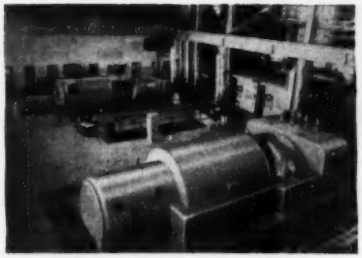
More Power to South America

from Pritchard





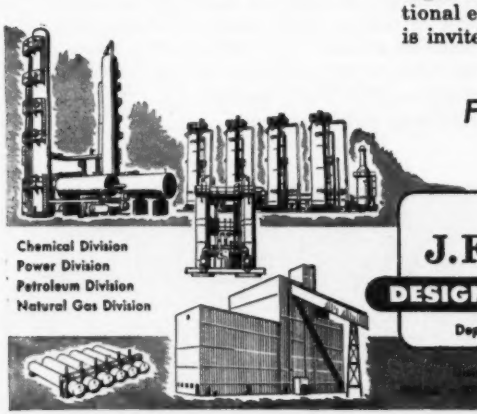
JUST 35 miles north of the city of Caracas, Venezuela, where the Andes Mountains rise from the Carribean, a new, modern building is nestled in a small valley on the seacoast. This building contains a *40,000 kilowatt* steam electric power station which ties into the distribution system serving the industrial and residential needs of the Federal District of Venezuela.



Interior of the 40,000 kw. steam electric power station designed and built by J. F. Pritchard & Co. near Caracas, Venezuela.

Designed, engineered and constructed by Pritchard, the Arrecifes Power Station of C. A., La Electricidad de Caracas, has boilers, turbines and all auxiliary equipment arranged for unit system operation without cross connection. This installation is another fine example of the many outstanding Pritchard-built plants that are providing maximum efficiency at lowest cost.

Whether *your* need is for a complete new plant, alterations or expansion, Pritchard provides the sound design, engineering and construction services that pay off in operational efficiency and trouble-free service. Your inquiry is invited.



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Westinghouse Induction Regulators installed at urban substations give double duty. They're dollar *makers* and dollar *savers*. They assure maximum revenue by faithfully delivering adequate and sustained voltage. They cut regulating costs because Westinghouse design provides sure operation with minimum maintenance.

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ROEBLING'S research staff is continually working at the job of product development. Our manufacturing facilities and techniques are constantly improved. That's why our Parkway Cable for distribution and general power supply circuits is today even more dependable than ever before.

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Large quantities of Roebling's full line of electrical wires and cables are needed in the rearmament program. We and our distributors will do everything possible, however, to meet your requirements. John A. Roebling's Sons Company, Trenton 2, N. J.

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For more information contact your nearby A-C sales office or write to Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 61B6152A.

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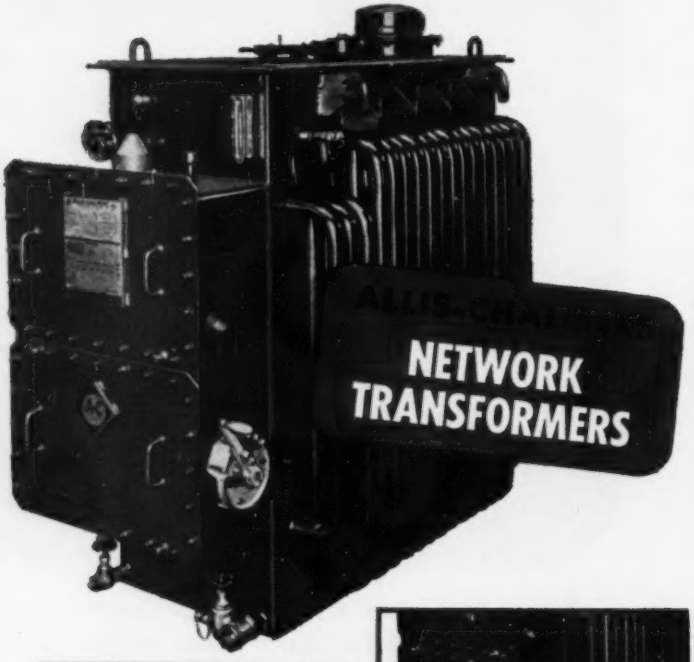

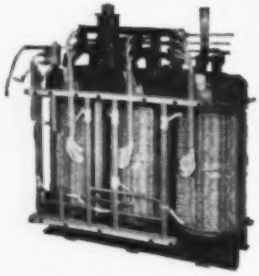

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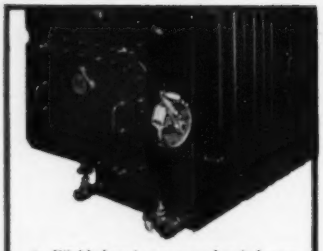

3. Welded main cover and switch compartment help eliminate gasket maintenance. Shot-blast cleaning, three coats of baked-on phenolic base paint formulated for high water resistance, and compound treatment of base areas give superior surface protection.

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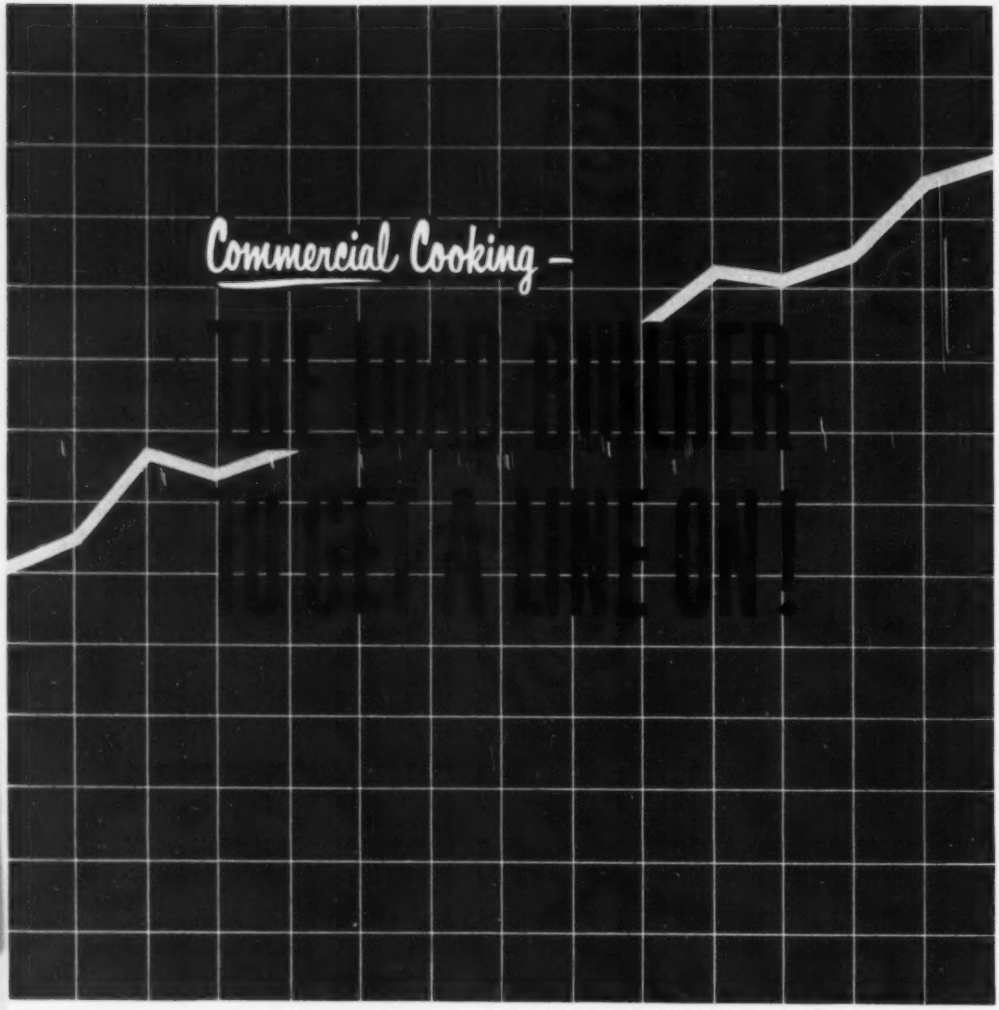

MORE AND MORE utilities are getting their lines on commercial electric cooking load—for very good reasons . . .

- . . . *it brings them an average 13% net return on each dollar invested!*
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MEETS MOST NEEDS FOR LOCATING FAULTS, on duct-installed cable up to 34.5 kv, also on aerial and buried cable.

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BIDDLE *Instrument News*

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Equipment now in use has proved highly effective in utility and industrial service. It has made real savings for owners in both time and money. Upon written request on your company letterhead we shall gladly furnish names of users. The coupon below will bring you more details in Bulletin 65 W.

"CABLE-FAULT LOCATING PRACTICES IN PHILADELPHIA"

That is the title of an article which appeared in a recent issue of Electric Light and Power Magazine. It was written by R. S. Diggs, Assistant Superintendent, Service Maintenance Section, Philadelphia Division, Electric Transmission and Distribution Department of the Philadelphia Electric Company.

Mr. Diggs discusses the three methods of locating cable faults used on his company's underground power systems, the a-c method, the thyratron, and the impulse method.

We have obtained a limited supply of these reprints and will be glad to supply them to interested individuals so long as the supply lasts. Ask for Bulletin 65 P1-W on the enclosed card.

James G. Biddle Co.
1316 Arch St., Phila. 7, Pa.

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Please send me material checked:

☐ 65 W ☐ 65 P1-W

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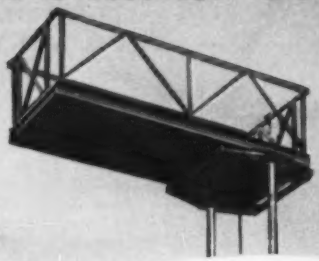

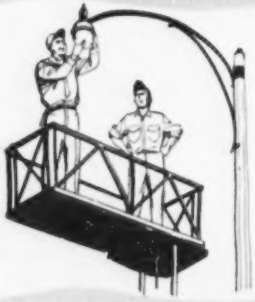

Proved by many years of trouble-free service, *Powers-American* bodies set the pace as the number one choice with utilities everywhere . . . the measurement of top quality and performance throughout the industry. "Job-engineering" steps up crew efficiency, lowers operating costs . . . protects your investment. *Powers-American* has the type body and equipment to do your particular job most efficiently and at lowest cost.

HYDRAULIC TOWER

Platform extends to 30' above ground and can be revolved full 360°. Operation is controlled from truck cab or by workman on platform. Models are also available in ground-to-platform heights of 21' and 25' for installation on chassis having a rated capacity of 1½ tons or more.

LINE CONSTRUCTION BODY (600)

Available in 9' to 14' lengths, equipped to meet individual needs in any phase of utility work.

REVOLVING AERIAL LADDER

Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.

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Ideally suited for all types of light duty maintenance and construction work.

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Designed for medium duty general service. May be furnished with winch and derrick capable of handling 40' poles.

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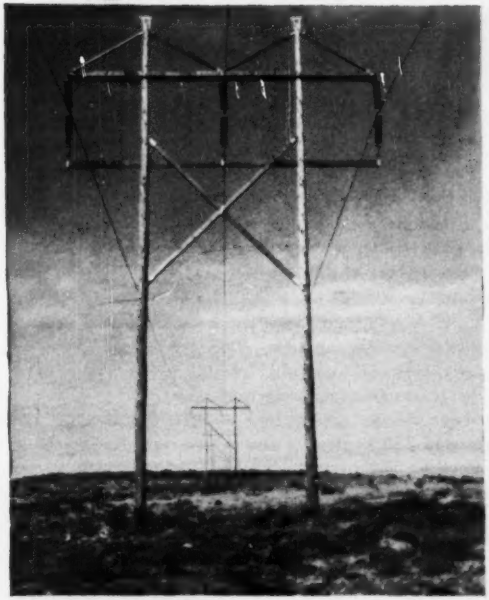

Thomas Insulators make certain that this 230-kv hold-down structure will give satisfactory service for decades to come.

"Where the going is rough . . . where trouble-free performance is a must . . . that's where Thomas *superior insulator quality* really pays off."

Shown on this page are just two of the many Thomas installations on the lines of a large Western Utility. For many years, this Customer has given us order after order. Such *repeat orders* from this and other companies are the best testimonials to the long life and outstanding performance of Thomas Insulators.

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Throughout the world, Thomas Insulators have been establishing service records since the advent of the Electrical Industry. Why gamble?

For this 69-kv medium-angle structure, Thomas Insulators have the stamina that assures long life and trouble-free performance.

The R. Thomas and Sons Company is a manufacturer and designer of all types of porcelain insulators . . . pin-type, switch, suspension, spools, guy-strain, bushings and special high-voltage porcelain. In addition, Thomas supplies associated line hardware, clamps, fittings, preformed armor rods, and so on.

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

— Since 1873 —

The R. Thomas and Sons Co.

1873 THOMAS INSULATORS our 79th year RELIABILITY 1952

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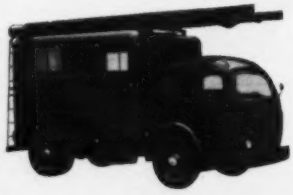
WITH THE BEST EQUIPMENT

There are two reasons for the superior performance of Holan utility bodies and equipment.

They are designed by the outstanding engineers in their field. They are constructed to withstand the rugged abuse of utility work.

Typical example is the heavy duty hydraulic tower with a rotary platform, illustrated here. The platform can be raised to 30 feet. It can be lowered to approximately 10 feet, 3 inches. Operation is completely automatic with push-button controls . . . and the platform can be rotated 330 degrees to give a working area 10 feet from the center line on both sides of the truck. It has exceptional platform stability and is easy to maintain.

No other tower offers so many advantages.



Lowered, the Holan tower settles close to the roof to clear low bridges and door openings. Rotary, stationary or transverse platform models can be mounted with many body types.

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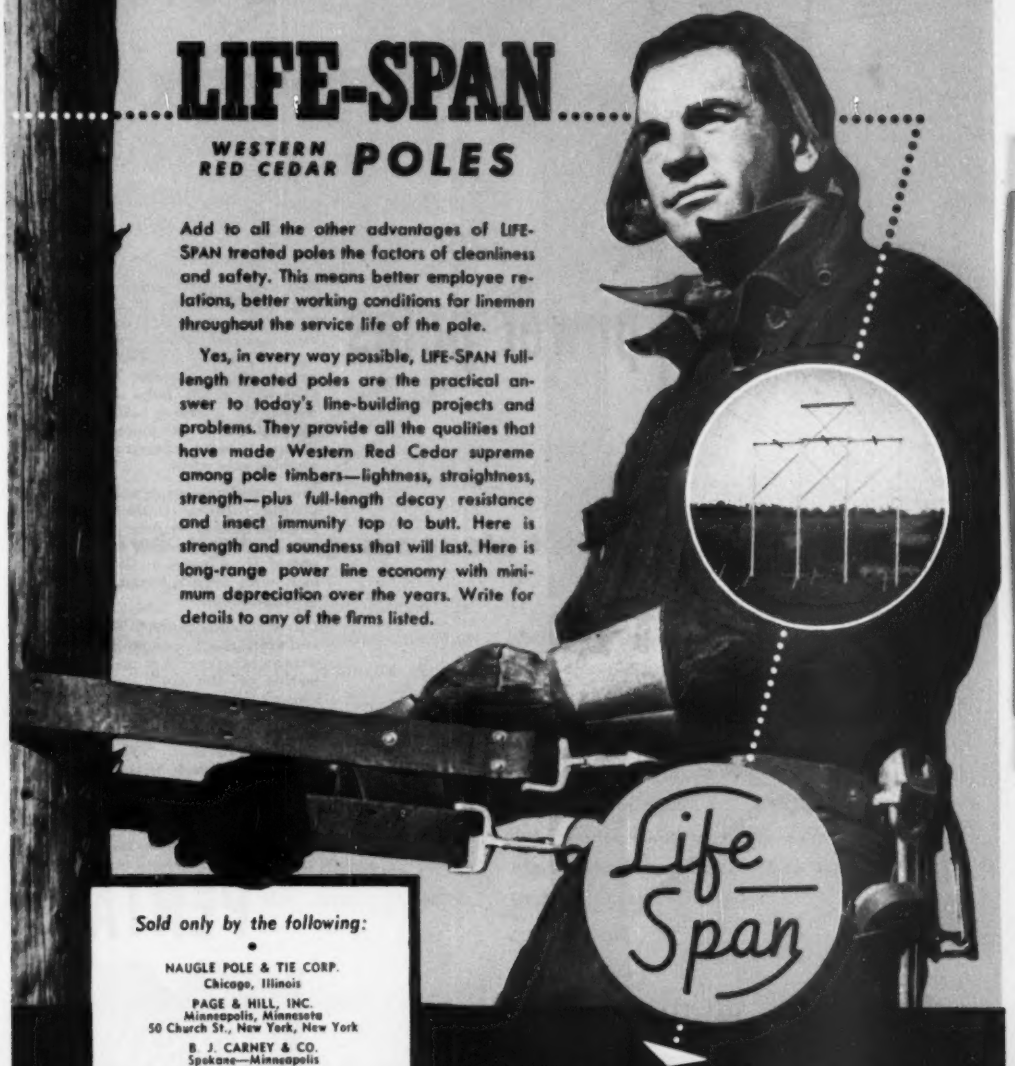
WESTERN RED CEDAR POLES

Add to all the other advantages of LIFE-SPAN treated poles the factors of cleanliness and safety. This means better employee relations, better working conditions for linemen throughout the service life of the pole.

Yes, in every way possible, LIFE-SPAN full-length treated poles are the practical answer to today's line-building projects and problems. They provide all the qualities that have made Western Red Cedar supreme among pole timbers—lightness, straightness, strength—plus full-length decay resistance and insect immunity top to butt. Here is strength and soundness that will last. Here is long-range power line economy with minimum depreciation over the years. Write for details to any of the firms listed.



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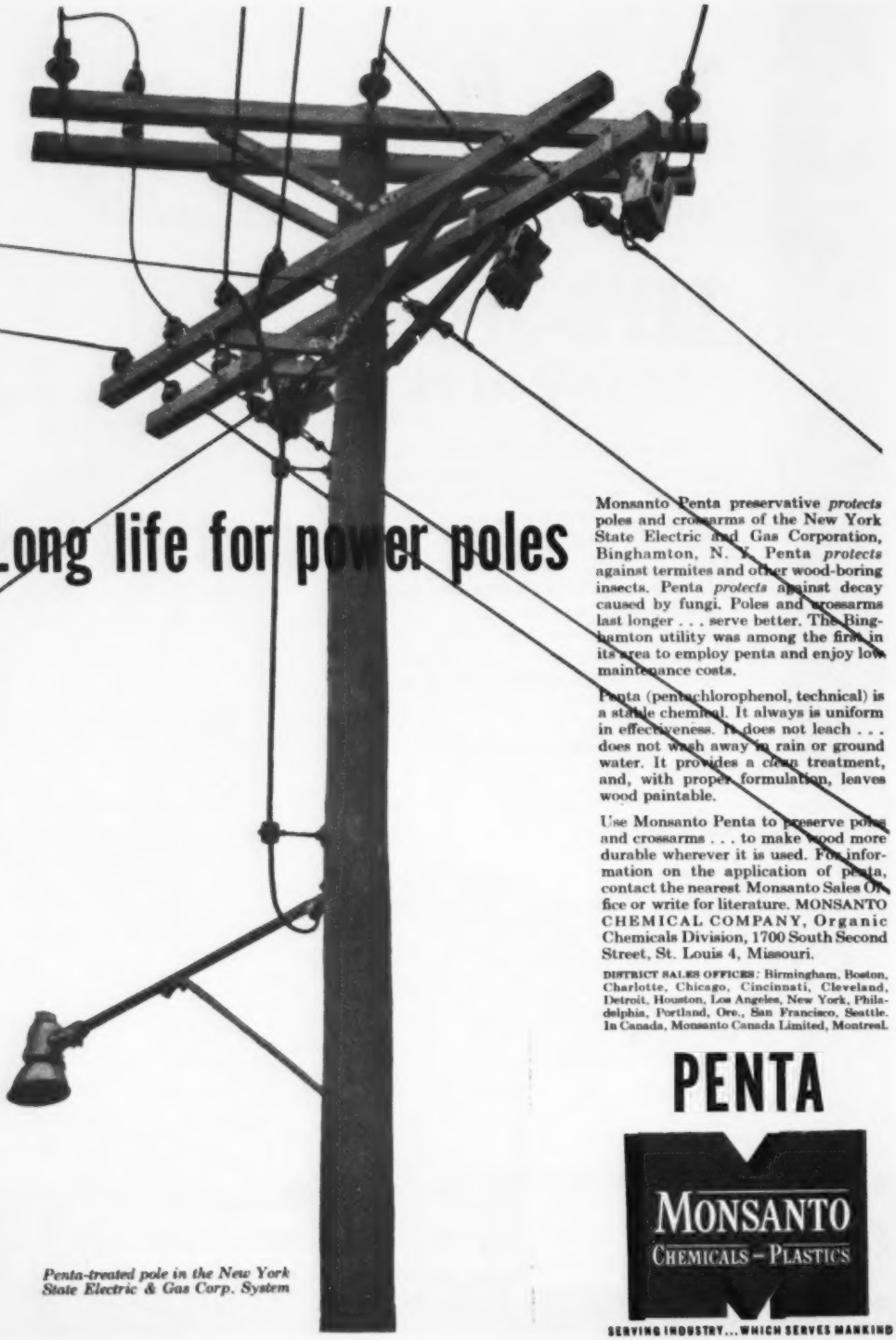

Long life for power poles

Penta-treated pole in the New York State Electric & Gas Corp. System

Monsanto Penta preservative *protects* poles and crossarms of the New York State Electric and Gas Corporation, Binghamton, N. Y. Penta *protects* against termites and other wood-boring insects. Penta *protects* against decay caused by fungi. Poles and crossarms last longer . . . serve better. The Binghamton utility was among the first in its area to employ penta and enjoy low maintenance costs.

Penta (pentachlorophenol, technical) is a stable chemical. It always is uniform in effectiveness. It does not leach . . . does not wash away in rain or ground water. It provides a clean treatment, and, with proper formulation, leaves wood paintable.

Use Monsanto Penta to preserve poles and crossarms . . . to make wood more durable wherever it is used. For information on the application of penta, contact the nearest Monsanto Sales Office or write for literature. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

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CHEMICALS – PLASTICS

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Sangamo J Meters

have damping magnets that are *permanent*

Sangamo Type J Watthour Meters are equipped with surge-proof alnico damping magnets to completely eliminate change in calibration.

Because the damping magnets control the speed of the meter, accuracy depends on the permanence of their strength. Alnico has many times the resistance to the demagnetizing effects of lightning surges as the best forged steel magnet materials.

The aluminum mounting clamp provides additional protection since it acts as an effective shield, further insuring the permanence of the damping force.

No report has ever been received of a J Meter speeding up in service due to loss in damping strength . . . and more than five million Sangamo Type J Watthour Meters are in service . . . many for more than ten years!

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.

SM52-3

The challenging

The C-D record speaks for itself—dependable, consistent, impressively efficient. One utility after another reports trouble-free service year after year, with little or no maintenance from their C-D capacitors.

A real tribute to the rugged, money-saving dependability of C-D capacitors. Actual performance records on request.

performance of C-D capacitors

These exclusive C-D features mean more value for your capacitor dollar:

- Case SAND-BLASTED for longer-lasting finish
- Solderless service connector
- Heavy-duty wet process porcelain bushings for longer creepage path, less breakage, higher impulse rating
- Wide margin between paper and foil provides higher impulse level
- Capacitor impregnated and case filled with non-inflammable, non-explosive Dykanol
- Use of C-D's Dykanol results in lower unit weight per Kvar; high stability; long life
- Many small sections in series-parallel results in low voltage gradient; no corona; lowest dielectric unit stress
- Only C-D capacitors (from 230 to 13,800 volts), are tested at full rated voltage for a period sufficient to establish ultimate heat rise

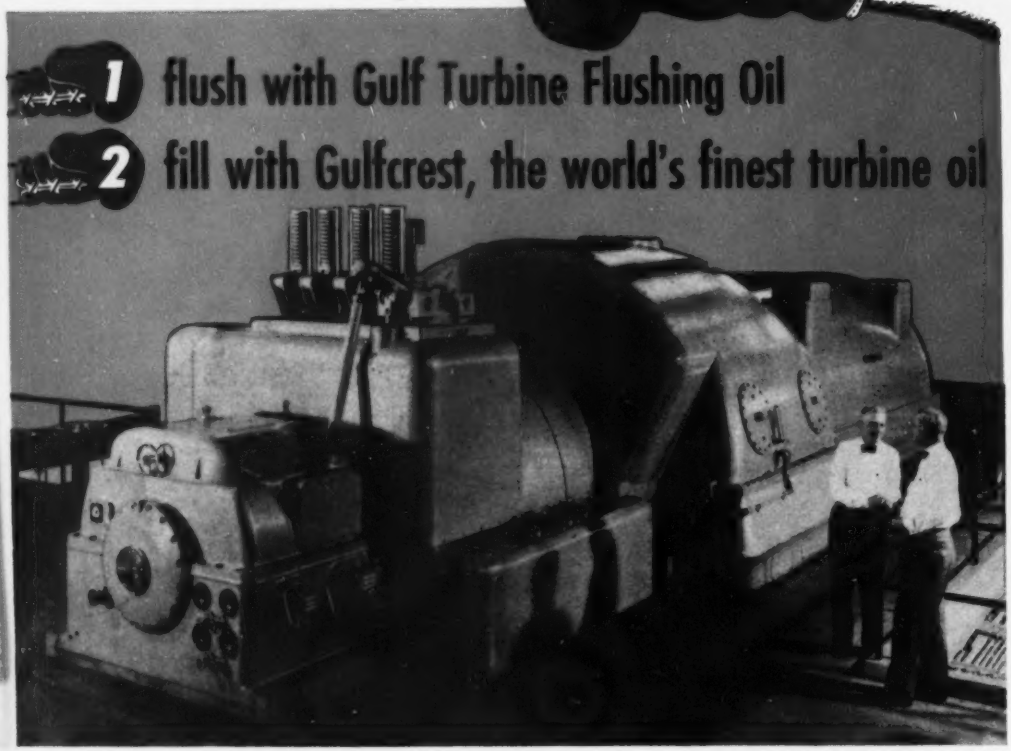
If you are considering an installation of industrial, station or pole-type capacitors for power-factor improvement, you can save maintenance dollars by talking it over with a C-D engineer. Cornell-Dubilier Electric Corp., Dept. D-32-B South Plainfield, N. J.

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

PLANTS IN: SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C. AND SUBSIDIARY: THE RADIART CORP., CLEVELAND, OHIO

Fight deposits and oxidation in turbine lubricating systems with **GULF'S** famous 1-2 PUNCH



By taking these two steps, you can insure top lubricating efficiency down through the years for your new steam turbine.

The use of Gulf Turbine Flushing Oil—before the initial fill of lubricating oil—will remove grease-type slushing compounds and carry away harmful abrasives which might be in the circulating system. And, it protects all oil-bathed surfaces against rust. Because Gulf Turbine Flushing Oil is itself a satisfactory lubricant, the undrained portion does not impair the lubricating value of the turbine oil.

Then, to keep the new system clean, fill with Gulfcrest Oil. Because of its outstanding resistance to oxidation, Gulfcrest maintains an exceptionally low neutralization number, and lasts indefinitely. With this high quality oil and good operating practice, you can be sure there will be no sludge deposits in cooler tubes, bearing pedestals or oil lines to worry about.

To get these benefits for your new turbines, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company
Pittsburgh 30, Pennsylvania

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"SKI-FLYING" FURTHER

THAN ANYONE BEFORE TAUNO LUIRO, A FINN, SET A NEW WORLD'S RECORD IN MARCH, 1951, AT OBERSTDORF, GERMANY, WITH A BREATHTAKING JUMP OF 456 FEET.

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Gold Seal Tape

GOES FURTHER, TOO...

GUARANTEED FOOTAGE
You get full measure with every roll. Tapes up tight and snug to the last inch.

NO WASTE
All Gold Seal Friction Tape tears evenly, does not ravel, molds to uneven surfaces.

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Less Gold Seal Tape needed per job. No pinholes; one tape thickness insulates.

LASTING "TACK"
Gold Seal sticks to the job under toughest conditions of cold and moisture.

EASY HANDLING
Gold Seal does not peel, dry out or smear the hands in hottest weather.

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Linemen and electricians prefer Gold Seal Tape. It saves time and trouble.

IT'S YOUR BEST BUY FOR PLANT SUPPLY
Specify Gold Seal Tape and save.

FRICTION AND RUBBER TAPES
In either 10-roll cartons or single rolls. Every roll sealed in cellophane, stays fresh. Jenkins Bros., (Rubber Division), 100 Park Ave., New York 17.

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet ASTM and Federal Specifications.

A PRODUCT OF JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

The plain hard facts prove you save with

CHEVROLET Advance-Design TRUCKS

FACT No. 1

MORE TRUCK FOR LESS MONEY

Compare the list price of a Chevrolet truck with that of any other truck built to handle the same payloads. You'll find the Chevrolet truck lists for less, yet brings you ruggedness, stamina and great truck features you won't find in many trucks costing much more.

FACT No. 2

ROCK-BOTTOM OPERATING COSTS

Dollar-for-dollar comparisons prove that Chevrolet trucks cost least to own and maintain. Valve-in-Head economy saves on gas, in the 105-h.p. Loadmaster or 92-h.p. Thriftmaster engines. Four-way engine lubrication reduces wear and oil costs. Rugged construction means long life.

FACT No. 3

ENGINEERED FOR YOUR LOADS

Every Chevrolet truck is *factory-matched* to payload and service requirements. You don't have to buy more truck—or settle for less truck—than you need for your loads. Frame, axles, springs, body, brakes and power are balanced for the job.

FACT No. 4

LOWER, SLOWER DEPRECIATION

Records show that Chevrolet trucks traditionally bring more money at resale or trade-in than many other makes. Chevrolet's market value stays up because the value stays *in!* Here is important and convincing proof that Chevrolet is the best truck buy!

CHEVROLET first in demand in value in sales

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR**—for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting • **HYPOID REAR AXLE**—for dependability and long life • **TORQUE-ACTION BRAKES**—on light-duty models • **PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES**—on medium-duty models • **TWIN-ACTION REAR BRAKES**—on heavy-duty models • **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **CAB SEAT**—with double-deck springs for complete riding comfort • **VENTI-PANES**—for improved cab ventilation • **WIDE-BASE WHEELS**—for increased tire mileage • **BALL-TYPE STEERING**—for easier handling • **UNIT-DESIGNED BODIES**—for greater load protection • **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

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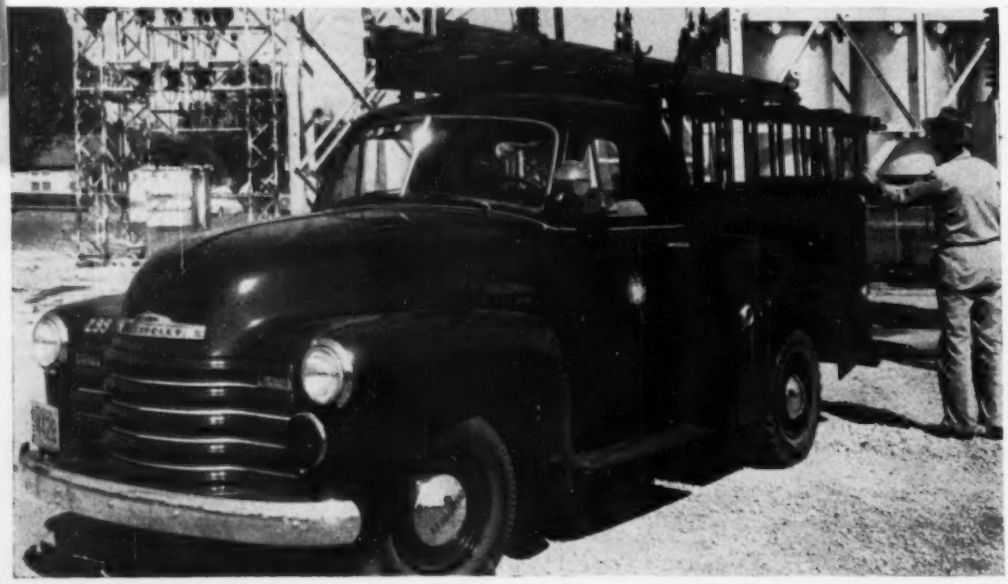

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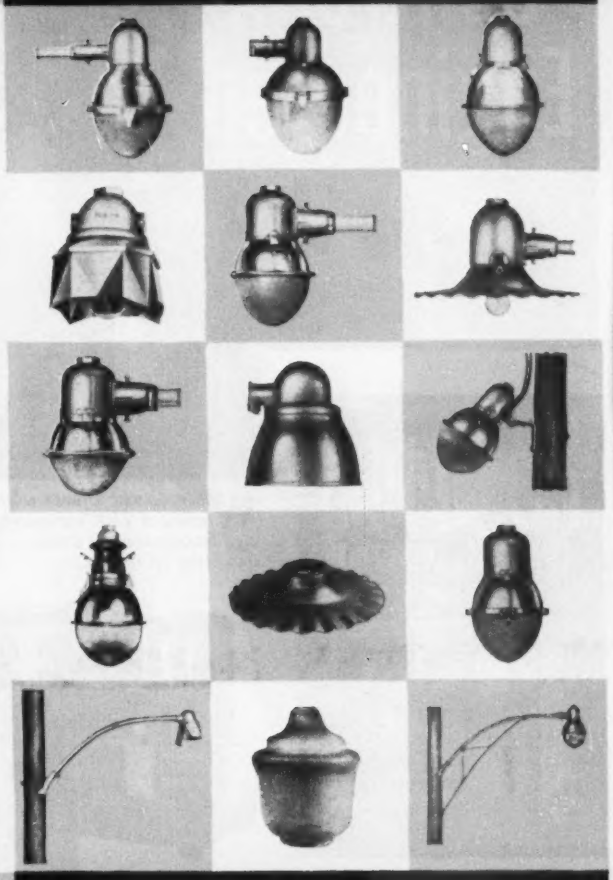

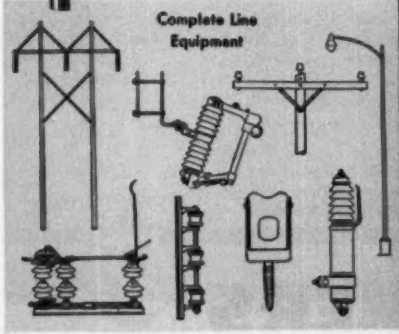

Complete Line Equipment

Joslyn

MFG. AND SUPPLY CO.

20 North Wacker Drive • Chicago 6, Ill.

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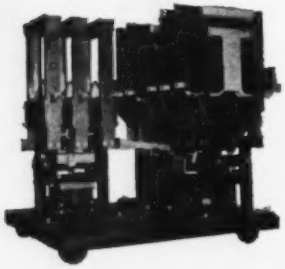
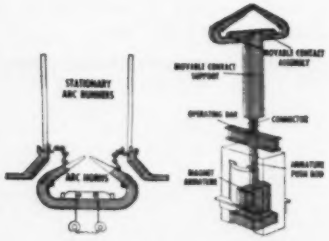
Control... Engineered for the Job

ALLIS-CHALMERS Starters
For 2300 to 5000-Volt Motors

WORKING THE RUBBER on this 84" mill line takes controlled power . . . the power of a 300-horsepower synchronous motor and the control of a reversing, dynamic braking starter . . . an Allis-Chalmers Type H Starter engineered specifically for the job. A-3556





RUBBER MILL CONTROLLERS provide complete control plus protection of motor, machine and personnel. Overload relays, auxiliary switches — all needed parts are selected to meet the specific requirements of this application.

THREE AIR CONTACTORS, mechanically interlocked, assure positive reversing and dynamic braking. They are mounted on a common base . . . roll out of the cubicle . . . are completely exposed for quick, easy inspections.

DOUBLE-BREAK CONTACTS, vertical action, dual blowout structure, and other features speed arc extinction, assure long life and low maintenance. For details about Type 256 Air-Break Contactors, get Bulletin 14B7303.

There are Allis-Chalmers controllers for use in every industry . . . starters for squirrel-cage, wound-rotor and synchronous motors. For starters to 2500 hp at 5000 volts — check with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 14B6410.

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Copper and **Aluminum** insulated conductors

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Copper, Aluminum and **Copperweld*** bare and weatherproof

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wire and cable

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Utilize the flexibility of

. . . . . for fast, accurate recording

Check this Flexibility

√ *Variety of circuits . . . potentiometer; Wheatstone, Kelvin and impedance bridge . . . for use with wide selection of sensing elements, including thermal converter illustrated on opposite page.*

√ *Variety of built-in switches for audible or visual alarms and signals.*

√ *Variety of chart speeds, from ½" to 120" per hour.*

√ *Variety of single-point and multi-point models, in choice of printing speeds.*

THE flexibility of the entire line of Brown instruments makes available a variety of combinations well qualified to fill the measuring, recording and signalling requirements of any power plant. Use of standard, interchangeable components simplifies maintenance, reduces parts-stocking problems.

Thanks to this flexibility, the *ElectroniK* Recorder is applicable to measuring temperature, pressure, flow, speed, pH, conductivity, power, current . . . the *same basic instrument for all*, with changes only in measuring circuit and sensing element.

Check the flexibility features . . . then call in our local engineering representative for a discussion of how they can add to your operating efficiency.

Dependability, Too!

The dependability you demand from your recording instruments is insured by the *ElectroniK* Recorder itself *and* by *Honeywell's nation wide* service organization . . . by the dependability of primary components which are life-tested, service-proved and designed for minimum, easy maintenance. You can appreciate at a glance the ruggedness of the high-torque balancing motor, the hermetically sealed converter, the simplified *continuous-balance* amplifier . . . as well as the minimum of moving parts and the obvious freedom from adverse effects of dust and atmospheric humidity.

ElectroniK Potentiometers

of megawatts and megavars

THE *ElectroniK* POWER RECORDER

Important Features:

- *Continuous Balance measuring system with electronic non-cyclic balancing, proved in thousands of industrial installations.*
- *Selection of ranges for generator output, station total generation, and tie line interchange.*
- *11-inch wide scale, readable at a distance... open, legible chart for detailed recording.*

WHEREVER continuous measurement and recording of electrical power are needed, the *ElectroniK* Recorder meets every power engineer's specifications. Supplied for any desired megawatt range, the instrument works with a thermal converter connected to standard instrument transformers. By adding a phasing transformer to the detecting circuit, it is readily adapted to measurement of reactive or "wattless" power.

Operating men like the *ElectroniK* Recorder's speed and accuracy, its 11-inch wide scale and chart which spreads load curves out in easily readable detail.

Maintenance men like the *ElectroniK* Recorder's ruggedness and simplicity, its small number of moving parts, its complete freedom from delicate mechanical linkages, its easily-serviced unit construction.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4568 Wayne Ave., Phila. 44, Pa. Service facilities available in more than 55 cities in the United States.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

First in Controls

● *Important Reference Data*

WRITE FOR DATA SHEET NO. 9.1-3...CATALOG 90-2, "SUPERVISORY INSTRUMENTS FOR POWER GENERATION."

POINTING the WAY
To Continuing Prosperity

The set of figures in the middle of this page is news of high importance to every American.

In effect, it says that there is no basis in fact for all this talk about a collapse of capital expenditures plunging us into a depression following the industrial build-up for defense.

Such talk assumes that without defense orders business would spend relatively little for new industrial plant and equipment. The figures below show that that assumption is not justified.

penditures in 1953, 1954 and 1955, provided the money to carry them out can be obtained.

A Record in '52

As was expected, their plans call for another record-breaking volume of capital expenditures by business in 1952. But, as many did not expect, the McGraw-Hill survey also discloses plans for very heavy capital expenditures in each of the three years following. Expenditures now planned for those years are, to be sure, lower than those planned for 1952. But the significant fact is not that

BUSINESS PLANS FOR NEW PLANTS AND EQUIPMENT (Millions of Dollars)

	Actual Spending 1950*	Actual Spending 1951*	McGraw-Hill Survey			
			Planned	— Preliminary Plans —		
			1952	1953	1954	1955
Manufacturing	7,491	11,141	12,921	10,028	8,525	8,194
Mining	684	806	943	415	321	358
Railroads	1,136	1,564	1,642	1,248	1,117	1,002
Electric & Gas Utilities**	3,298	3,676	3,948	3,360	3,204	2,748
Other Transportation & Communications	1,392	1,592	1,721	1,671	1,943	1,839
ALL INDUSTRY	14,001	18,779	21,175	16,722	15,110	14,141

*U. S. Department of Commerce
**Electrical World (A McGraw-Hill publication) and American Gas Association.

The figures come from the fifth annual McGraw-Hill survey of business plans for new plant and equipment. Companies were asked to report through that survey not only their plans for 1952, but plans they now have in hand for capital ex-

they are lower. Experience shows that plans made several years ahead always overlook many expenditures that are needed later.

The significant fact is that the expenditures already planned for 1953-55 are so high. For example,

those now planned for 1955 would be higher than those of 1950, which, at that time, were second highest in our history.

If these plans are carried out we shall have an essential element of continuing prosperity. Sustained expenditures for capital expansion and betterment account directly for a large share of our employment and consumer income. Moreover, consistent modernization of industrial plant raises production efficiency and brings more and better goods and services within reach of more consumers.

It is not to be expected, of course, that we can come down from the peak of the defense boom without readjustments in some sectors of business. But if capital expenditures by business are carried out on the scale now planned, we shall be able to take any necessary readjustments in our stride, and continue to increase our industrial strength.

From V-J Day to the end of this year, manufacturing industries will have spent over $60 billion for new industrial plant and equipment. This is more than the value of all the plant and equipment these industries had on their books at the end of World War II. It is this heavy outlay that causes some, assuming most postwar plans for industrial expansion and modernization will be completed, to fear a collapse of capital expenditure.

Plans to Go Ahead

But American industry still has plans to go right ahead expanding and improving its facilities. This was the most striking single finding of this year's survey.* It disclosed also that after 1952:

— 83 per cent of the companies answering the survey are planning substantial further modernization.

— 48 per cent will need more capacity to make their present products.

— 33 per cent plan additional capacity to make new products.

It cannot be too strongly emphasized, however, that these plans represent what American industry *wants* to do. They are a concrete expression of hope and aspiration. As such they are extremely important, for they dispose of the idea that business considers the job of expanding and improving its facilities as finished, or anywhere near finished.

But the plans carry no guarantee of accomplishment. If they are to be realized, business must have the funds to carry them out. There is no assurance that the money will be available if the present level of corporation taxes is continued. Eight out of ten companies, according to the McGraw-Hill survey, will rely entirely on profits and reserves to finance their 1953-55 programs. So, in calculating their programs for these years, the companies were asked to assume relief from "excess profits" taxation.

Federal taxes now take at least 52 per cent of a corporation's profits, and 82 per cent of any profits in the so-called "excess profits" bracket. Despite this drain on their funds, companies are able to finance their 1952 programs because (1) they are borrowing heavily, and (2) many of them are getting government loans or special tax concessions on new facilities installed for defense purposes. But these are emergency aids.

Only Two Ways

When the present defense program tapers off, there will be only two ways by which business can possibly increase its principal source of funds for new plant and equipment. One way is to make more profits before the tax collector takes his cut. And the only way many companies, already operating at capacity and high efficiency, can do that quickly is by raising their prices. That is an unpopular method. Also, with the return to more competitive markets, it might be self-defeating.

The other way is for the federal government to release its strangle hold on business profits. The so-called "excess profits" tax—the 82 per cent tax which is really a tax on business growth—should be repealed, effective January 1, 1953. And a cut in the basic tax of 52 per cent on all corporate profits should come not much later. That is by all odds the most important single step toward assuring that business plans already made for capital investment in 1953, 1954 and 1955 are carried out. It is the most important single step toward sustaining our present prosperity.

Through its plans for continued expansion and improvement of its facilities, American business clearly points the way to avoid the depression that so many have feared—and the Communists have so ardently hoped—would follow the peak of defense mobilization. It will be a tragedy for our country and for Americans in every walk of life if we do not insist that business get the chance to follow this wise and constructive course.

McGraw-Hill Publishing Company, Inc.

***Note—A copy of the full report of this survey can be obtained by addressing: Department of Economics, McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York 36, N. Y.**

KERITE
CABLE-GRAM
THERE'S AN IMPORTANT DOLLAR DIFFERENCE BETWEEN SERVICE AND MAINTENANCE: THE MORE SERVICE THE SELLER PUTS INTO HIS PRODUCT THROUGH QUALITY MANUFACTURE, THE LESS MAINTENANCE TIME AND EXPENSE THE BUYER HAS TO WORRY ABOUT.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.

DAYS KERITE

KERITE CABLE

THE KERITE COMPANY
30 Church St., N. Y. 7, N. Y.
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582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.

Needed—Utility Leadership in Merchandising

The present outlook for production of electrical appliances is distinctly bullish. Apparently there will be plenty of them in the first half of this year and more than plenty in the second half. To move this increasing volume into the homes of America is a job that will require much more active selling than is now being done.

It is distinctly to the advantage of our whole economy, and particularly of the electric utility industry, that the flow of home appliances from maker to user be free and fast. Any damming up anywhere along the stream will be harmful. And of this there is real danger.

The danger is at the retail level. There are many reasons—some good, some poor—why appliance dealers can't or won't do the kind of selling job that is needed. Whatever the reasons, the condition exists. It must be dealt with.

Electric power companies are selling appliances. Though general opinion is that only about half of the companies do, the true figure is nearly two thirds. We can be so positive because the figure comes from a 100% survey of those companies with 5,000 meters or more. Details of the survey are given on Page 122.

The survey discloses that 167 out of 249 power companies merchandise appliances. But it does not tell how many of the 167 are selling with the vigor and enterprise that characterize the program of Toledo Edison Co (Page 116).

Of the 249 companies merchandising 170 have assigned personnel whose duty is to maintain contact with dealers in cooperative promotion of appliance sales. However, the survey isn't clear as to how many companies are not just making motions but are really cooperating with dealers the way Pennsylvania Power & Light Co is (Page 120).

The appliance manufacturers also are doing much, undoubtedly will do more, to expedite the movement of their products from dealers' stocks to homes of users. National advertising, point-of-sale displays, selling instructions, contests and prizes to stimulate dealer activity, all the ways that can be thought of to increase sales, are being employed.

But this is not enough, never has been, never will be. There is an added force needed on the local scene that only the utility can supply. It is leadership. Leadership that converts competition for sales into creation of sales. Leadership that demonstrates that organized sales effort is more effective than the best single-handed activities of individual dealers. Leadership that shows what can be done by doing it.

Circuit Court Blocks SPA

The Circuit Court of Pulaski County, Arkansas, has decided that Congress and Arkansas law cannot be bypassed even to promote federal power expansion. The court has reversed an obviously invalid commission decision which would have permitted REA through the Arkansas Electric Co-op to supply generating equipment and transmission lines for the sole use of Southwestern Power Administration (EW,March17,p10).

This case originated when the Arkansas co-op requested commission approval for a 30,000-kw steam generating plant, 544 miles of 69-kv transmission, and 22 step-down substations. The entire output of the generating station for 40 years was to be sold to SPA which was also to have an option to purchase all facilities. In return SPA was to sell to the co-op all of its electric power and energy requirements.

The proposal was turned down on two counts. First, the Arkansas statute says that an electric cooperative may dispose of electric energy only to its members and other cooperatives organized under the same act. SPA does not fall in this category. Second, SPA is only authorized to "sell and distribute hydroelectric energy produced by dual purpose dams. It is not authorized to purchase energy produced by steam plants."

This decision does not deprive the cooperative of a low cost power supply. Nor does it prevent SPA from disposing of its hydroelectric power at a satisfactory rate. The decision does give us all renewed confidence in the judiciary and the fact that justice can prevail. It should give others renewed enthusiasm to fight for what is right regardless of the odds.

To the companies who fought through the case to this decision, we offer our congratulations.

The Last Gasp from Truman

President Truman's message to the annual convention of the National Rural Electric Cooperative Association should be preserved as an important historical document. Certainly it is important because it contains all of the insidious terms and techniques of the subsidized federal power advocates. It can also be construed as the Fair Deal platform for 1952.

We say this is a historical document because it will be relegated to history. The American people will no longer put up with the kind of govermental interference sponsored by the present administration. The statement also reaches a new level of absurdity when it says that federal power policy is democratic not socialistic and that the power companies' "advertising campaign itself is pretty close to 'socialism' because the taxpayers finance so much of the cost."

We find in his statement that when a utility expects a return on investment to pay interest charges on money borrowed that it is a "toll" which it does not deserve. Although 80% of the people receive their supply of low cost power from utilities, they are not benefitted in the eyes of Truman since the hand of government did not have a part in the transaction.

The President gives federal power credit for industrial growth and new jobs. Apparently he has not scanned the areas of greatest industrial expansion in the current period, or he would have found them in power company areas.

We conclude by saying that President Truman need look no further than his own back yard for "special privilege," the payment of "toll" or "tribute" and most of all "socialism." But if luck is with us, he will soon have his last look at the White House back yard and his last gasp on this subject as President.

Save with Overhead Transmission

The Los Angeles Department of Water and Power should be commended for its forthright stand on behalf of an overhead transmission link north of Los Angeles. It could not do otherwise in discharging its responsibilities to meet the electrical demands of the community. It also, as General Manager S. B. Morris said, had to be assured of "no single class of consumers paying more than its just share of the cost of service."

We believe the Department is justified in pressing condemnation suits against the owners of 53 dwellings since studies showed that overhead construction would cost only $11 million compared with $29 million for underground. Basically the decision affects three groups—those whose homes must be moved, those who own property adjacent to the proposed line, and the customers of the Department.

The first group will suffer little more than the inconvenience of having to move. The second group undoubtedly presents the most difficult problem. At first glance one might suspect that the presence of a high voltage transmission line in the back yard would be highly undesirable. Actually it is now well established that properly-designed and maintained transmission lines have practically no effect on television or radio reception. Surveys have shown that properties adjoining rights of way sell for as much and are improved and utilized as rapidly as properties distant from the line.

The third—and by far the largest—group stands to benefit materially from the decision to construct the line in the most economical way. Rates for the consumers of a public utility, whether publicly or privately operated, are determined by the cost of supplying the service. And initial cost is a big factor. If our utilities are to provide the best possible service at the lowest possible cost, they must continue to do everything within reason to save capital expenditures.

The Los Angeles Department of Water and Power has done an outstanding job in trying to discharge its responsibility to all the people it serves.

GE Adopts "Share Owner"

It is good to see one of the largest companies in the United States take the initiative and adopt "share owner" in place of stockholder as the appellation for those who own its common and preferred stocks.

Henceforth, the General Electric Co has decided to use this term because it feels that "share owner is the more accurate and descriptive term, denoting a sharing of the risks as well as the profits of the incentive system rather than merely holding of stock."

Electric utility companies might well consider adopting this term for those who risk their savings in the industry with the hope of sharing in its profits but with the full understanding that they will also share in its losses.

THE ELECTRICAL WEEK

Featured in the News

President Truman condemns drive against his power policy as "vicious propaganda" in message read at NRECA Convention (p 106) . . . In a surprise move, DPA gives **industry expansion** the green light (p 108) . . . Engineers' duties are redefined at SEC Engineering-Operation Section meeting (p 109) . . . U. S. Circuit Court of Appeals in San Francisco lifts ban on **SEC hearings** on sale of Washington Water Power Co. (p 111) . . . Economist forecasts business stability at **Nema Winter Meeting** in Chicago (p 113) . . . EEI has map of farm electrification status in U. S. (p 114).

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Latest from Washington—House Appropriations Committee has recommended cuts of more than half a million dollars in **FPC Budget** for next year and $15 million for TVA . . . Bonneville Power Administration has agreed to lease an **REA-financed transmission line** to serve Midstate Electric Cooperative at Lapine, Ore. . . . Interior Secretary Chapman last week finally got around officially to petitioning the Supreme Court to review the **Roanoke Rapids decision . . .** House and Senate Public Works Committees still have set no meetings to discuss the **Niagara power redevelopment bills . . .** FPC is going ahead with its routine processing of a license application for a **hydroelectric project on Feather River** in California despite the fact that Reclamation Bureau is trying to reserve all sites in the basin . . . California Congressmen are trying to head off any Interior Department commitment to take **Shasta Dam** electric power into Nevada.

Sen Warren Magnuson, Washington Democrat, is asking that powers of the Voluntary Credit Restraint Committee be limited so as to pave the way for Public Utility Districts in his state to complete purchase of Puget Sound P&L properties. This would also remove one of the possible stumbling blocks in PUDs' effort to buy Washington Water Power Co.

Public Service of New Mexico has offered to supply co-operative in northern New Mexico firm power sooner and at a lower cost than contemplated in co-ops' plans for building own facilities. Public Service says it can save the co-ops an investment of $5.8 million in the power plant and $1.2 million in transmission lines, as well as supplying power a year sooner and more than half a mill per kwhr cheaper.

Financial—Detroit Edison's Pres Walker L. Cisler tells annual stockholders meeting company hopes to effect savings of $1 million annually through more effective use of fuel in its steam plants . . . A "dead heat" was produced when Halsey Stuart & Co and Salomon Bros & Hutzler both bid 100.15 for a 3-⅜% interest rate for $6 million new bonds of **Southwestern G&E** due in 1982. On revised bid issue was awarded to Halsey Stuart & Co which offered to pay 100.23 versus Salomon Bros' bid of 100.2119 . . . **Delaware P&L** borrows $1 million from banks at 2-¾%.

General Electric Co has shipped one carload of heat pumps to Standard Brass Manufacturing Co, Houston, Tex., with half consigned for Beaumont and other half for New Orleans. A second carload will be shipped with half going to Shreveport and other half to Houston. Still another carload is enroute to other Texas distributors at Dallas.

EEI's Pres George M. Gadsby is being interviewed this week on radio by Bill Slater on "Americans, Speak up!" produced by America's Future, Inc. Watch your local papers for date and time.

Rates—Duke Power gets South Carolina PSC approval to up rates about $1 million more a year . . . Opelousas, Mo., City Council cuts municipal rates after survey by Burns & McDonnell. Mayor T. W. Huntington estimates the reduction to commercial users from 23 to 30% . . . Union Light, Heat & Power notifies Kentucky PSC it plans to raise its rates March 27 after posting bond . . . Missouri PSC sets hearing March 31 for **Empire District Electric's** 14% rate increase.

American G&E System puts into operation fourth unit of 150,000 kw in Philip Sporn plant which brings total capacity of plant to 600,000 kw . . . **Fitchburg (Mass) G&EL** spins second 10,000-kw unit at Sawyer plant.

From the Southeast—Carolina P&L is using women in place of men in dealer-aid appliance sales program. Company gets North Carolina PSC approval to make, beginning April 1, a $2 service connection charge versus no charge now . . . South Carolina E&G has recently revised residential rates to provide a more desirable rate for electric house heating . . . **Duke Power** claims more electric water heaters (about 164,000) on its system than on any other privately owned utility. Can any other company top this? Company also is operating ingenious new selsyn motor control in its new dispatching room which enables operator with a simple twist of a knob to throw a projected image of any one of the 32 diagrams on a large screen located at present on the room wall.

Arthur E. Silver, retired Ebasco engineer from Montclair, N. J., has received the Lamme Medal for pioneering in rural electrification, AIEE announced today. The medal will be presented at AIEE's summer general meeting in Minneapolis June 23.

Congratulations—Connecticut Power Co elects **Charles Bolton** vice president in addition to being secretary-treasurer . . . Atlantic City Electric's Pres **B. L. England** will be honored April 1 by the Atlantic City Press Club by being named "Citizen of the Year" for that city, for doing the most to publicize and promote Atlantic City . . . Monongahela Power elects **Don B. Potter** vice president . . . Hawaiian Electric elects **Ralph B. Johnson** vice president and secretary . . . New England Power Service elects **Robert F. Krause** president, succeeding Edwin A. Dow who becomes chairman.

WASHINGTON COMMENT

JESSE MOCK

MARQUIS CHILDS autographs some of the copies of "The Farmer Takes a Hand" which were sold at the recent convention of NRECA

Last summer Washington columnist Marquis Childs toured rural electric cooperatives in many parts of the country enjoying the warm hospitality and fried chicken of the farm folk. This month Childs filed a long thank-you note to his hosts in the form af a 250-page book, "The Farmer Takes A Hand" (Doubleday Co, $3.50). Mostly it is filled with praise for his hosts and the National Rural Electric Cooperative Association, which assisted in its preparation and is guaranteeing a sale of 5,000 copies to its members.

A thoroughly readable document, "The Farmer Takes A Hand" relates some of the highlights of the farm electrification program with emphasis on the part played by the federal government and the farm cooperatives. Also included are a large number of thumbnail sketches of the leaders of the electric co-op movement both on the local and the Rural Electrification Administration level in Washington. To round out the book are some interesting sidelights on activities of individual co-ops and Childs' editorial comment.

Utilities Hissed as Villains . . . Power companies are the villains of this piece from the first chapter to the last. He follows the line of NRECA, lobbying organization for most of the co-ops. But within the electric co-op movement Childs admits that opposition to electric companies is not unanimous. Some leaders would like to see the long fight ended. As one of them told Childs, "We've got the same interests; if we both set to work, there's enough work to keep everybody busy for the next 20 years. We're the companies' best customers, and we're buying more power from them every year."

But Childs believes the majority of co-op members want to keep the way clear to go into the power generating business themselves. "These are the men," he says, "who feel there is no way around the bitterness, the implacable opposition, that has come of the long conflict."

But There Are Some Good Companies . . . The stinging attacks on the industry are somewhat mellowed by an occasional good word for individual companies. Georgia Power Co is praised for its long-standing cooperation with the co-op movement. Despite the harmonious relations, there is now the threat that a federal agency will take over some of the company's co-op customers.

Idaho Power Co is credited with doing a generally good job of farm electrification, but its success in buying out co-ops is frowned upon. Iowa Power & Light Co is given a pat on the back for working with co-ops.

The story that Childs sets out to tell is a significant one in American history. Yet Childs seems reluctant to trust his readers with the whole story. As it is, the book makes pleasant propaganda for NRECA, and in a cheap edition the lobby group hopes to give it wide circulation.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Ball-point pens of mogul dimensions have proven useful in getting good traces on circuit breaker travel analyzers.

Fleece-lined synthetic rubber gloves are available for hand protection over 400 F range from 314 F down to −85 F.

Coal pulverization by explosive emission from steam guns (a la puffed rice) may some day prove practicable.

Gallium melts at 85 F and boils at 3500 F. Few uses have so far been found. The $1300 per pound price is a slight obstacle to wide application.

Room air conditioner sales in 1939 were 9,000. In 1950 the sales were 194,000. The home is viewed as a virtually untapped-field. Distribution systems beware.

Substituting most modern and efficient equipment for older and less efficient equipment is the kind of good business that made America great.

Traveling wave magnitude at reaching a station bus is influenced substantially by the number and configuration of lines terminating on the bus.

Insulation level reduction of 20% could conceivably save more than $100,000 on a 230-kv autotransformer bank. Arresters could probably be lowered to 75% (182 kv).

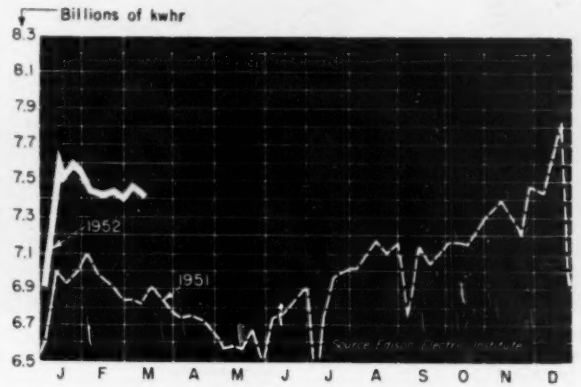
Impulse tests may prove not to be so reliable a criterion of transformer insulation longevity as an accelerated life test at power frequency.

Mechanical refrigerator sales have totalled 44,000,000 since 1925—more than one unit per present 42,000,000 wired homes.

Conventional motor-starting equipment may not always protect a motor from the unbalanced voltages that result from odd transformer connections when one phase-fuse blows.

Service entrance voltage tests (93,573) by 17 utilities showed (for 120-v mode) that 54% were above 118 v and 10% below 113. Average 118.2, median 118.9.

STATISTICS



Output Week Ended March 15—7,413,795,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Mar. 15	+ 7.4	+4.6	+6.1	+4.0	+7.3	+9.6	+17.8	+8.6	+4.8	+11.9
Mar. 8	+10.3	+7.3	+7.9	+8.1	+9.1	+17.2	+19.1	+9.1	+5.8	+9.1
Mar. 1	+ 8.7	+6.5	+5.1	+5.3	+6.9	+17.7	+19.7	+9.4	+6.6	+4.8

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Dec.	70.5	68.7	64.1
Capacity (Million Kw)	Jan.	75.91	75.54	69.10
Production (Billion Kwhr)	Dec.	33.14	32.10	30.66
Hydro		9.13	8.08	8.69
Fuel		24.01	24.02	21.97
Sales (Billion Kwhr)	Dec.	28.44	27.92	26.07
Residential		7.95	7.37	7.01
Commercial		4.77	4.68	4.29
Industrial		13.74	13.89	12.92
Other		1.97	1.97	1.86
Fuel Consumption				
Coal (Million Tons)	Dec.	9.60	9.72	9.39
Oil (Million Barrels)		6.29	5.95	6.32
Gas (Billion Cu Ft)		52.72	53.70	44.22
Net Income Class A & B Utilities ($ Million)	Dec.	100.82	70.81	84.83
Dec. 52 Peak (Million Kw)*	Dec.	81.1	80.7	75.3
Kwhr per Residential Customer (12 Month Average)	Dec.	2,004	1,988	1,830
Revenue per Kwhr Residential Service (12 Month Average)	Dec.	2.81¢	2.82¢	2.88¢
Canadian Production (Billion Kwhr)	Dec.	5.11	4.94	4.67

Business Statistics

FBR Industrial Production Index†††	Feb.	215*	215	217
Gross National Product Annual Rate ($ Billion)	4th Qtr.	333.0	327.6	303.7
E. W. 5 Industry Production Index	Feb.	124.8	124.4	119.7
ENR Construction Cost Index††	Mar.	115.4	115.1	112.8
BLS Consumer's Price Index	Jan.	189.1	188.6	178.8
NEMA Insulation Materials, Sales Index†	Dec.	466	511	564
NEMA Electric Appliance Sales Index†	Dec.	218	269	364
NEMA Household Refrig. Sales Index†	Dec.	115	87	219
Metal Prices				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.19	.19	.17
Zinc, prime Western E. St. Louis, lb		.19½	.19½	.17½
Tin, Straits, qual. N. Y., lb		1.21½	1.21½	1.34
Aluminum, ingot, base price		.19	.19	.19
Nickel, base price		.56½	.56½	.50½
Steel, billets, Pitts., ton		56.00	56.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

*Estimated †1936=100 ††1949=100 †††1937-39=100 (Unadjusted)

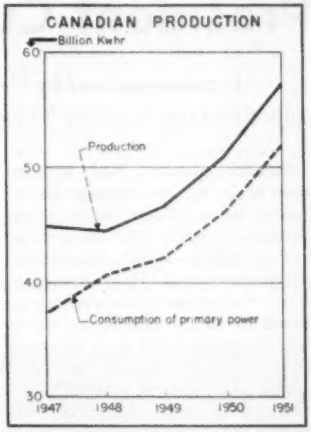
Canadian Production Reaches Record Level

A record net production of 57.4 billion kwhr in 1951 by Canadian central stations has been reported by the Dominion Bureau of Statistics. This is an increase of 12.8% or 6.5 billion kwhr over the previous record established in 1950.

Of the 1951 total, 55.57 billion kwhr was produced by hydro stations.

Gross exports during the year to the United States totalled 2,375,420,000 kwhr, up over 23% compared with 1,925,778,000 exported during 1950.

The annual consumption of primary power was 51.90 billion kwhr during 1951.



Secondary power is delivered to the consumer as and when it is available. It is interruptible, and in Canada the greater part of it is used by pulp and paper mills in electric boilers.

Power shortages, resulting from the adverse hydro conditions experienced during 1948 and 1949, made it necessary for some industries to change their operating schedules to take advantage of the low consumption during the night and weekends, and thus, used power which normally would be sold as secondary. Consequently, the ratio of secondary power to total output, 13.9% in 1947, declined to 5.9% in 1948, and rose to 6.9% in 1949 as conditions eased slightly.

Heavy primary demand during 1950 reduced this percentage to 6.5. During 1951 the figure stood at 6.8%.

NRECA'S CLYDE ELLIS: We have no quarrel with the electric companies . . . though most don't like us

INTERIOR'S OSCAR CHAPMAN: The campaign to destroy federal power policy must not succeed

ILLINOIS' ADLAI STEVENSON: There is place for both government action and private enterprise

President Cudgels the Power Industry

In a message read by Chapman at NRECA Convention, he calls attacks on his policy 'vicious propaganda'

President Truman had not announced he was a candidate for re-election when he drew up his recent message on power—but his message read as though he had. He damned private monopoly. He said the nation's resources should be used for the benefit of all the people, not just a few. In language and tone, he hewed close to the pattern that won him success in the campaign of 1948.

Interior Secretary Chapman, who delivered the President's message at the 10th annual convention of National Rural Electric Cooperative Association in Chicago, said later it was a restatement of the Administration's public power policy. He added some remarks to leave no doubt that it was very much his personal policy, too.

"I don't believe in government for special privilege," the President said. "When electric power is produced with the people's money it ought to be used for the benefit of the people and not for the benefit of the private power companies.

"Those are the principles on which the federal government has been operating. But the private power lobby has never agreed with those principles and it doesn't agree with them now. That is what is back of the attacks on our federal power policy today."

Doctrine . . . The policy, he said, provides for multiple purpose river-basin programs, including development of hydroelectric power, and assures widespread use of this power by preventing private companies from monopolizing it.

In the face of federal development that has actually helped the private companies expand capacity, output, revenues and profits, Truman said, "the forces of private monopoly are today attacking this policy on many fronts, behind one of the most vicious propaganda barrages in history."

Because the people were convinced of the value of the federal power program, he asserted, private power interests stopped attacking the program and shifted to a new line of propaganda.

"They raised the cry of 'socialism'," he said, "apparently on the theory that if you can't persuade people, maybe you can frighten them; if you haven't got the facts, try a few scare words.

"If the people ever come to be persuaded that the free enterprise system means they have to pay tribute to private companies in order to enjoy the great natural resources that belong to all of us, then they are going to be doubtful about the free enterprise system itself. That is not what the free enterprise system means to me."

Indictment . . . The President said the drive had the main purpose of restoring the unlimited right of private monopoly to exploit the nation's water power resources. He listed "examples:"

- The forces of reaction want to monopolize St. Lawrence power at the bus bar, and even take over Niagara Falls itself for private development.
- They are trying to block rural electric cooperatives in Missouri from tying together steam and hydro plants that will result in more power at lower cost.
- They are trying to grab the Hells Canyon Reservoir site on the Snake River.
- They are trying to prevent public bodies in the State of Washington from buying power facilities that private companies are "willing and eager" to sell.

"For my part," he concluded, "I am determined to do everything I can to see that the policy of conserving and developing our priceless water power resources for the public benefit shall go forward."

Industry Rages . . . The President's speech drew an ovation from NRECA delegates and a howl from private industry. Edison Electric Institute had no official comment, but the Chamber of Commerce of the United States charged public power advocates were "trying to toss all Americans into the

arms of socialism from the springboard of government monopoly."

Though they were overshadowed by the hotly political issue injected by the Truman message, there were several indications at the convention that the co-ops and private power companies might actually be moving closer to agreement after years of bickering:

● Clyde R. Ellis, executive manager of NRECA, told delegates he "had no quarrel" with the private utilities. He pointed out the co-ops depended more than 50% on consumer companies, "most of whom don't like us, even though we paid them $45 million last year for wholesale power." He indicated he hoped this feeling could be changed.

● Sen Wayne Morse, Oregon, Republican, while praising Chapman's power stand, said, "We need to recognize that private utilities and cooperatives can exist together and can cooperate." He pointed out that in the Pacific Northwest many companies and co-ops have done just that.

● Adlai Stevenson, Illinois governor mentioned as a possible Democratic candidate for president, told delegates he thought the rural electric cooperative movement was a good argument for the proposition that there is a proper place in the country's economic scheme for both government action and private enterprise.

At the final session, Vice Pres Clyde H. Seybold was moved up to president, and W. Gordon Loveless was elected vice president. Tom E. Craddock was re-elected as secretary-treasurer.

Promotes Power Use . . . A resolution adopted unanimously called on all co-ops to strengthen local programs directed at promoting power-use by individual members. The delegates heard Agriculture Secretary Charles F. Brannan, Rural electrification Administrator Claude Wickard, and Ellis urge that "wired hands" be put to work where hired hands are not available.

"Life Blood" Resolution . . . Terming the right of co-ops to build their own generating and transmission facilities the "life blood" of the rural electrification program, a unanimously adopted resolution called on members of Congress to do everything possible to defend this right.

Wickard told the 4,000 delegates: "If you ever lose the opportunity you have to make your own decisions as to where you are going to get your power, you may well find yourself in the position of being squeezed out of the rural electrification picture."

"Equality Clause" . . . Several speakers pointed out that the "preference clause" of the flood control act was under fire. Ellis said a number of proposed federal transmission lines were being delayed because of attacks on the philosophy of this clause, which he termed the "equality clause."

Alex Radin, general manager of the American Public Power Association, told a discussion group the preference policy is under "relentless attack" from the power companies. "It is obvious," he said "that the industry is out for the kill." He called for a joint APPA-NRECA effort to defend the policy.

A resolution adopted by the convention called for continuance of the preference clause. In other resolutions, the association supported a number of individual federal power projects including the St. Lawrence Seaway, Ice Harbor and Hartwell Dams. It also urged repeal of the Keating Amendment, which restricts construction of transmission lines by the Bureau of Reclamation.

Labor Courted . . . Association and government spokesmen appeared bent on trying to woo back support of organized labor lost by some rural co-op wage policies. Both Ellis and Wickard touched on the subject.

Speaking with election-year fury, Democratic Rep Clarence Cannon of Missouri said Congressmen who vote to cripple REA "should have their hides nailed to the door—no matter which party they belong to." He said opposition to REA this year is more active, more ruthless and better-financed than ever.

Which twin . . . . . is Miss REA 1952?

Answer: The one seated at the right, above. She is Miss June Bottcher of Cullman, Ala., whose father is a member of Cullman Electric Cooperative. Her twin is Joan Bottcher, who did not enter the annual contest. June (extreme left in the group picture) was selected from among eight candidates at the NRECA convention.

DPA DEPUTY Ralph S. Trigg: the man at the switch as . . .

It came as a surprise to the industry: Last week Defense Production Administration set up a new goal of 32 million kw to be added by the end of 1954. DPA's action meant:

- **Utilities and electric equipment manufacturers will be assured sufficient material allotments to meet the new expansion**
- **Rapid tax amortization certificates will be passed out to utilities and manufacturers with less delay**
- **Electric equipment manufacturers will have to consider plant expansion and more manpower**

Power Expansion Gets a Green Light

In contrast to military production stretch-out, Defense Production Administration last week gave the green light to a speed-up of electric power expansion.

Specifically, the agency set up a goal of 32 million kw in generating capacity to be added between the first of this year and the end of 1954. This is 2 million kw more than the industry was shooting at last fall, but this extra is probably accounted for by increased demands for atomic energy expansion. The goal applies only to Class I utilities, which produce about 95% of the nation's electric power.

Surprise for the Industry . . . The new target came as something of a surprise to the electric industry, which has been waiting for some sort of Depa-approved program since the Morehouse Committee filed its report early this year (EW, Jan. 14, p 77). Hard-hit by scant material allotments all last year and the first quarter of this one, the industry has been wondering how it could meet its self-set goal of 30 million kw for 1952 through 1954. Establishment of the goal should help solve that problem.

In announcing the goal, Deputy DPA Administrator Ralph S. Trigg said, "The new capacity is needed to meet the rapidly increasing demands of the defense program and simultaneously to maintain an adequate supply of electric power for civilian uses."

Probable Effects . . . Officially the new figure is to be used merely for guidance of mobilization officials in allotting materials and in studying applications for rapid tax amortization on power plants and new electric equipment manufacturing plants. But from the practical standpoint, it probably means:

1. Utilities and electric equipment manufacturers will be assured of sufficient material allotments to meet the goal set by DPA.
2. Rapid tax amortization certificates will be passed out to utilities and manufacturers with less delay.
3. Electric equipment manufacturers will have to consider plant expansion and more manpower.

Even before the target figure was finally approved by Trigg, steps had already been taken to step up the allotment of materials to utilities and manufacturers for use in the third quarter. Claimant agencies such as Defense Electric Power Administration and the Electric Equipment and Engine and Turbine Divisions of National Production Authority were told to submit material requests to meet the power goal.

If the new goal is not reflected in the original third quarter allotment figures, DPA officials believe it will be reflected in supplemental allotments during the third quarter.

EED, ETD Stand to Gain . . . Depa will not fare a great deal better in the third quarter than in the second. However, Electrical Equipment Division stands to get about 15 to 20% more controlled materials for its power production and distribution codes than during the second quarter. En-

Electric Capacity Expansion:

	DPA Goals	Depa Estimates
(Capacity additions in millions of kw)		
1952	9.0	9.5
1953	11.0	12.2
1954	12.0	8.4

gine and Turbine Division stands to up its materials take by 10 to 15% for power items.

In addition to increased quarterly allotments, all three claimant agencies will also be eligible for advance allotments greatly in excess of those now given. Where material can be made available and advance allotments are vitally necessary, it is hoped that the advances will be on the order of 100% of the need. At present these advances run as low as 50%.

Larger allotments are not expected to entirely solve the procurement problems, but at least they will give the utility or the manufacturer more opportunity to concentrate on cashing the tickets.

No Blank Check . . . This will not mean a blank check for the electric power industry. There is no quick sure way of getting copper or nickel, and CMP tickets for these scarce metals will be kept in line with actual supply. But where utilities can substitute aluminum for copper, DPA will try to make the aluminum allotments available.

Since the beginning of the rapid tax amortization program, utilities and electric equipment manufacturers have experienced difficulty in obtaining quick consideration of their applications. Part of the reason is that officials had no approved figure as to the amount of expansion needed for the defense program. With the goal, these officials now have a guide on which to base their issuance of certificates for new plants.

This will likely mean more rapid processing of applications.

Headaches for Manufacturers . . . This increased electric power goal brings new and difficult problems to the manufacturers. First to be considered is how much plant expansion will be needed to meet the increased demand for equipment. Although firm figures are not readily available, it is believed a great deal of production capacity will have to be added.

Production requirements will be especially large for heavy transformers and some types of switchgear as well as for boilers and, to a less extent, turbines. Fabricated pipe is also in this category. Some plant expansion is already underway, but it is doubted that this is large enough to take care of the demands that will fall on manufacturers in the next three years.

TAKING TIME OUT for a chat at SEE-engineering-operation section conference are (l to r) J. B. Coltharp, Gulf States Utilities; W. T. Hess, vice president, Louisiana Power & Light; B. M. Gatling, Jr, Westinghouse Electric; and J. W. Talley, managing director of SEE

SERIOUS DISCUSSION is being carried on at SEE meeting by (l to r) J. A. Rawls, Virginia Electric & Power; O. J. Miller, vice president, Duke Power; G. S. Dinwiddie, president, New Orleans PS; G. C. Rawls, vice president, Louisiana P&L; A. J. Skaale, Carolina P&L

SEE Redefines Engineers' Role

Duties of utility engineers today must be extended far beyond the frontiers of technology and into the realms of public and employee relations if the industry is to remain under business management and advance in the face of a growing shortage of technically trained employees.

What these duties are was spelled out last week by presidents of two large southern power companies at the Engineering and Operating Conference of the Southeastern Electric Exchange in New Orleans, March 13 and 14.

W. O. Turner, president, Louisiana Power & Light Co said today's job is to keep the industry from being taken over by government. As their part, he asked engineers to find out and keep abreast of what is going on in company departments, cooperate with them, become more vocal, take part in the industry's regional and

national organizations, and finally to exercise their rights as citizens.

Shortage Acute . . . Roy S. Nelson, president, Gulf States Utilities Co warned that the shortage of engineers is becoming acute but that it can be alleviated if engineering supervisors will give young graduate engineers job responsibilities that are challenging and incentives for advancement.

Top management in industry has too long failed to devote enough attention to the field of human relations W. V. Merihne, General Electric Co, told the group. The future of private enterprise, depends on a new "whole top" man in operating management who is as efficient and successful in employee relations as he has long been in engineering, manufacturing, marketing, and finance.

C. B. Delafield of Consolidated Edison Co urged the industry to support the "More Power from Niagara" proposal of the five New York State electric companies. He characterized the federal and state governmental plans for developing Niagara a "clear-cut naked grab for power which must be stopped".

Transmission Economy . . . Economic comparisons of transmission at 240, 287 and 360 kv, show that capability at 330 kv is 2.06 times that at 230 kv H. P. St. Clair, American Gas & Electric Co, said. Relative cost of a two circuit 330-kv line however is only 1.28 times that of a 230-kv line. If slower rates of growth and more conservative estimates of future development are realized St. Clair said, some possible savings may result from more conservative choice of transmission voltage. On the other hand, savings with higher voltage may be very large if rates of growth are badly underestimated.

H. J. Scholz, Southern Services, Inc, urged standardization of a high transmission voltage in the Southeast. Standardization, he said, would facilitate and cut the cost of interconnections by eliminating large capacity auto transformers otherwise required. W. T. Hess, Louisiana Power & Light Co said that 110 kv was getting to be a "distribution voltage" on his system. He said a higher standardized voltage was needed to haul the large capacities of their new larger generators.

Cost Comparison . . . Construction cost of single-circuit wood-pole 110-kv lines along city streets is about one-fourth the cost of a high voltage underground cable, according to A. C. Henderson, Georgia Power Co. High voltage underground cable installations cost practically double that of average cross country wood H frame lines, he said.

A pioneer installation of 75,000 kvar of 110-kv switched static capacitors at the NACA Langley Laboratory will save approximately $4.50 per kvar in plant investment compared with a synchronous condenser, T. S. Martin, Virginia Electric & Power Co said.

A "breaker and a half" plan for Barry Steam Plant 110-kv substation will cost approximately 7% less than a corresponding three bus plan, according to J. W. Graff, Alabama Power Co. With this plan any one breaker per bay can be taken out of service for maintenance without the necessity for by-pass switching or for the transferring of relay protection.

Substations made of aluminum are easy to assemble, have excellent appearance and require little maintenance, according to Elmer Housley, Knoxville Power Co. Aluminum tubular conductors give equal rigidity in all directions. This is advantageous in withstanding ice, wind, and short circuit loads, he stated.

Aluminum in Distribution . . . In the field of distribution circuit design, L. T. Guess, Aluminum Co of America, said the use of covered aluminum for services comes nearest being a "pure substitution" for copper. Even here, he said, linemen should be trained to give aluminum the same sag as copper; not to use the same amount of muscle. Problems of stringing aluminum in urban distribution are simpler if use of copper and aluminum conductors on the same pole is avoided, he said.

Tignards Fail to Hold Back Flood

Snow covers the large flood gates of this French-built dam near Tignes, west of Lyon in the Savoy Alps near the Italian border. The project is part of a hydroelectric development which will have a total capacity of 800,000 kw.

Opening of the flood gates last week spelled doom for the village of Tignes, whose residents have resisted the project since it got underway. As the gates were opened, police troops swooped down and forced Tignards to move to new homes that have been readied for them nearby. It is estimated that by April 10 waters from the artificial lake will reach the village. Eventually it will be covered by 500 ft of water.

Puget P&L Expansion Rejected

Whatcom PUD says joint board which proposed program to boost utility's capacity is not "legally constituted"

The Whatcom County PUD of Bellingham, Wash., has rejected a plan from a joint board representing six other PUD's in the state to expand generating facilities of the Puget Sound Power & Light Co, following proposed purchase of the company by the PUD's. It expressed doubts that the joint board is "legally constituted."

No Legal Authority Now . . . Frank Stewart, spokesman for the joint board, answered that the board had made no claims of having legal authority at the present time but would have legal authority when all seven PUD's officially have approved the purchase plan. That Whatcom and Snohomish PUD's are the only groups which have not yet approved the plan. However, they have unofficially indicated their approval. They are not involved to the same extent as the other PUD's, as they already have their own distribution systems.

Snohomish is awaiting the report of a consulting engineering firm before it votes on the purchase plan. Should it reject the plan, indications are that the Douglas or Mason PUD's would be invited to participate.

More Generating Equipment . . . The expansion program would increase capacity of the company's generating facilities from its present 325,000 kw to a total of 500,000 kw. A first step would install additional generators at the company's Baker River and White River plants, adding 72,000 kw, with the second step probably consisting of an upstream development on Baker River and enlargement of the Shuffleton steam plant near Seattle to produce about 103,000 kw. The company owns a damsite above the present Baker River hydro plant at which it is indicated a substantial amount of hydro power could be developed.

Frank McLaughlin, Puget's president, believes capacity of its hydro generating plants in western Washington could be increased an estimated 100,000 kw while capacity of the Shuffleton steam plant could be increased from its present 80,000 kw to some 500,000 kw.

Cost of the expansion program has not been estimated. Stewart said the PUD's want to show federal authorities they can expand the company's present system to meet the area's power needs.

Financing Being Planned . . . The PUD group is reported to be completing plans for the issuance of $115 million in revenue bonds to finance the purchase of Puget Sound P&L. It has been reported that the bonds will be sold to John Nuveen Co and associates, Chicago, at an interest rate not to exceed 3½%.

Court Lifts Ban . . .

. . . on SEC hearing on proposed sale of WWP common stock to 3 PUD's in Washington

The Circuit Court of Appeals in San Francisco has vacated its stay against the Securities and Exchange Commission's hearing on the proposed sale of Washington Water Power Co's common stock by American Power & Light Co to three Washington Public Utility Districts. (EW, Feb. 25, p 71).

It dismissed the PUD's petition for review of the order, ruling that although a provision of the Holding Company Act provides that the commission cannot regulate what the utility districts may buy, the act delegates "adequate authority to the commission to regulate what and how American may sell."

The Chelan, Stevens, and Pend Oreille PUD's had secured a temporary restraining order forbidding the SEC to hold hearings on the proposed transaction, contending that the commission had no jurisdiction over the sale of such stock to public bodies.

Court Ruling . . . The court's ruling points out that "the tentative character of the financial arrangements" for the $65,115,000 proposed sale, and the "expedients to which the petitioners will be obliged to resort in an effort to avoid another state court injunction" make it apparent that the transaction has "a long road to travel." It declares, "there is fair reason for the commission's proposed inquiry as to whether the transaction is "susceptible of reasonably prompt consummation."

It added that whether the sale is "susceptible of reasonably prompt consummation" is a consideration of vital importance to the investors who have their money in the enterprise, and whose possible interest in the alternative plan to distribute the stock to AP&L stockholders—should be a concern of the commission.

Judges ruling on the case were Albert L. Stephens, William Orr, and Walter L. Pope.

FINANCIAL BRIEFS

Black Hills Power & Light Co stockholders took 28,413 comon shares of 33,730 offered on 1-for-6 basis at $17.75 via rights, and 26,480 shares were asked under oversubscription privileges.

Public Service Electric & Gas Co, Newark, N. J., is planning to sell common stock and debentures this year . . . **Wisconsin Electric Power Co** is considering the sale of about $26.8 million in securities of which about $12.5 million will probably be bonds and the balance common stock to present holders on 1-for-6 basis.

Iowa Power & Light Co stockholders will vote April 9 for a limit on borrowing of 20% of capitalization instead of the present 10% limit.

REGULATION

Orange and Rockland Electric Co has received New York PSC approval to increase rate rates by 6.5%, effective March 3 . . . **PR&W Electric Cooperative Association, Inc,** Wamego, Kansas, has received State Corporation Commission approval to continue to Aug. 31, 1952, the $1 surcharge on all regular monthly billings to its customers. The commission has also taken under advisement application of **Pioneer Electric Co-operative,** Ulysses, for a rate hike of about 10%.

Today in Utility Finance

YIELDS (%)

Quality	Bonds 1st	Bonds 2nd	Bonds 3rd	Preferred Stocks 1st	Preferred Stocks 2nd	Preferred Stocks 3rd	Common Stocks 1st	Common Stocks 2nd	Common Stocks 3rd
DATE									
1952									
March 13	**2.97**	**3.01**	**3.14**	**4.16**	**4.33**	**4.69**	**5.33**	**5.91**	**6.55**
March 6	2.96	3.03	3.12	4.17	4.36	4.70	5.33	5.91	6.59
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.52	6.24	7.05
2nd 1951	3.02	3.11	3.23	4.11	4.37	4.68	5.73	6.38	7.37
1st 1951	2.87	2.93	3.00	3.96	4.19	4.52	5.47	6.20	7.13

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months	Period Ended	Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Connecticut Light & Power	12	Jan.	$7,087,186	$7,266,444	$ .94	$1.01
Iowa Electric Light & Power	12	Jan.	2,021,569a	2,124,424a	1.51	1.60
Tampa Electric	12	Jan.	1,742,517	2,050,501	2.91	3.43
			1951	**1950**		
California Electric Power	12	Dec.	$1,605,833	$1,768,888	$ .54	$ .71
Delaware Power & Light	12	Dec.	3,294,348	3,728,063	1.68	1.95
Hartford Electric Light	12	Dec.	2,712,313	2,807,444	.....	.....
Interstate Power	12	Dec.	1,900,694	1,867,968	.80	.83
Louisville Gas & Electric	12	Dec.	5,164,395	4,791,910	3.14	3.00
Pennsylvania Power & Light	12	Dec.	12,616,791	11,918,244	1.60b	1.5 b
Potomac Electric Power	12	Dec.	5,191,626	4,423,679	1.12	.94
Shawinigan Water & Power	12	Dec.	5,045,576	5,308,301	1.84	1.98

NOTE—The figures shown for the last eight companies have been audited.
a—Includes net income of Central States Electric Co.; b—On outstanding shares at end of each period.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF MARCH 13-19			
Bonds			
Southwestern Gas & Electric—1st mtg 3¼% 1982	$6,000	$100.75	3.335%
Pacific Gas & Electric—1st mtg 3¼% 1985	55,000	101.92	3.28
Narragansett Electric—1st mtg 3¼% 1982	7,500	102.384	3.25
Gastonia, N.C.—water and electric light 1953-1989	1,350	various	1.05-2.40
Common Stock			
Black Hills Power & Light—33,750 sh (being offered to commonholders on 1-for-6 basis (a), record Feb. 28 to expire Mar. 13)	$599	$17.75	7.21%
Arkansas-Missouri Power—18,605 sh (being offered to commonholders on 1-for-19 basis (a), record Feb. 29 to expire Mar. 17)	251	13.25	7.55
Middle South Utilities—600,000 sh	13,170	21.95	5.47
WEEK OF MARCH 20-26			
Bonds			
Oklahoma Gas & Electric—1st mtg 1982	$12,000	.....	.....
Consolidated Edison Co of New York—1st mtg 1982	50,000	.....	.....
Common Stock			
Mississippi Valley Public Service—15,000 sh (being offered to holders on 1-for-5 basis, record Mar. 7 to expire Mar. 21)	$285	$19.00	7.37%
Arizona Public Service—400,000 sh	.....	.....	.....
SCHEDULED FOR MARCH-APRIL			**Bid Date**
Bonds			
Texas Power & Light—1st mtg 1982	$14,000		March 31
Texas Power & Light—debentures 1977	5,000		March 31
West Penn Power—1st mtg 1982	12,000		April 1
San Diego Gas & Electric—1st mtg 1982	12,000		April 1
Interstate Power—1st mtg 1982	2,000		April 2
Consumers Power—1st mtg 1987	25,000		April 9
Alabama Power—1st mtg	12,000		April 22
Preferred Stock			
Indianapolis Power & Light—30,000 sh	$3,000		.....
Common Stock			
Portland General Electric—250,000 sh	.....	.....	**March 27
Texas Utilities—409,689 sh (being offered to commonholders on 1-for-12 basis (a), record Mar. 5 to expire Mar. 28)	$13,315	$32.50	5.17%
Central Louisiana Electric—53,616 sh (being offered to commonholders on 1-for-7 basis (a), record Feb. 25 to expire Mar. 31)	1,582	29.50	6.78
Interstate Power—345,833 sh (to be offered to commonholders on 1-for-6 basis (a), record April 2 to expire April 18; company will name price with underwriters bidding on compensation)	.....	.....	April 2
Southern California Edison—800,000 sh	.....	.....	*
Gulf States Utilities—(b)	6,500	.....	April 29
Indianapolis Power & Light—196,580sh (to be offered to commonholders on 1-for-7 basis)	.....	.....	.....

*To be offered by First Boston Corp group, underwriters.
**To be offered by Blyth & Co group, underwriters.
a—Stockholders are allowed oversubscription privileges.
b—To sell enough common stock to yield an aggregate of $6.5 million.

CALENDAR

A&M College of Texas
Annual Conference for Protective Relay Engineers, Department of Electrical Engineering, College Station, Tex., March 24-26.

American Society of Mechanical Engineers
Spring Meeting, University of Washington, Seattle, March 24-26; Semi-annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio, June 15-19.

American Power Conference
(Formerly Midwest Power Conference)
Sherman Hotel, Chicago, March 26-28.

Oklahoma Utilities Association
Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28.

Edison Electric Institute
18th Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 31-April 3; Electrical Equipment-Prime Movers Committees, Edgewater Beach Hotel, Chicago, May 5-6; Association of Edison Illuminating Companies Meter-Service Committees, Edgewater Beach Hotel, Chicago, May 5-7; Transmission-Distribution Committee, Edgewater Beach Hotel, Chicago, May 6-7; Hydraulic Power Committee, Edgewater Beach Hotel, Chicago, May 6-7; Purchasing Stores Committee, Roosevelt Hotel, New Orleans, La., May 11-14.

Illuminating Engineering Society
Southwestern Regional Conference, Hotel Tulsa, Tulsa, Okla., April 6-8; Southern Regional Conference, Hermitage Hotel, Nashville, Tenn., April 20-22; Canadian National Conference, Hotel General Brock, Niagara Falls, Ontario, Can., April 30-May 2; Great Lakes Regional Conference, Hotel Statler, Cleveland, Ohio, May 5-6; East Central Regional Conference, Webster Hall Hotel, Pittsburgh, Pa., May 22-23; Northeastern Regional Conference, Hotel Preston, Swampscott, Mass., June 19-20.

American Institute of Electrical Engineers
Southwest District Meeting, Jefferson Hotel, St. Louis, Mo., April 15-17; Welding Conference, Rackham Memorial Bldg., Detroit, Mich., April 16-18; arranged jointly by American Welding Society, Detroit Section, and Industrial Electrical Engineers Society, Detroit; Northeast District Meeting, Arlington Hotel, Binghamton, N. Y., April 30-May 2; Summer General Meeting, Hotel Nicollet, Minneapolis, Minn., June 23-27.

Pacific Coast Electrical Association
Administrative Services Section Conference, Hollywood-Roosevelt Hotel, Hollywood, Calif., April 17-18; Business Development Section Conference, Hotel Huntington, Pasadena, Calif., April 24-25.

Pennsylvania Electric Association
Spring Meeting Motor Committee, Hotel Yorktowne, York, Pa., April 17-18; Communications Committee, Americus Hotel, Allentown, Pa., May 1-2; Spring Meeting, Relay Committee, Lawrence Hotel, Erie, Pa., May 8-9; Electrical Equipment Committee, Hotel Roosevelt, Pittsburgh, Pa., May 15-16.

Southeastern Electric Exchange
Annual Conference, Boca Raton Hotel, Boca Raton, Fla., April 21-23.

American Public Power Association
Spring Convention, Hotel Olympic, Seattle, April 29-May 1. Joint Meeting with Northwestern Public Association, April 28.

National Electrical Manufacturers Association
4th International Lighting Exposition-Conference, Industrial-Commercial Lighting Equipment Section, Cleveland Auditorium, Cleveland, May 6-9.

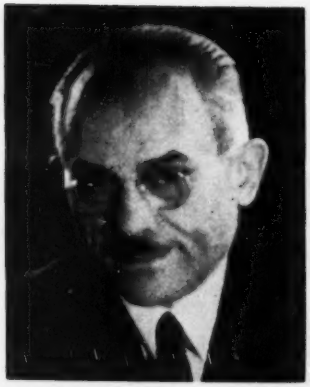
Northwest Electric Light & Power Association
Engineering-Operation Section, Rainbow Hotel, Great Falls, Mont., May 7-9; Business Development Section, Chinook Hotel, Yakima, Wash., May 12-14; Personnel Section, Vancouver Hotel, Vancouver, B. C., May 19-21; Accounting-Business Practice Section, Medford Hotel, Medford, Ore., May 22-23.

★Interstate Power Club
Hotel Martinique, New York, May 12.

C.I.G.R.E.
(International Conference on Large Electric High-Tension Systems). 14th Biennial Session, Paris, France, May 28-June 7.

International Organization of Standardization
Triennial Meeting, Columbia University, New York, June 9-21.

★National Retail Credit Association
International Consumer Credit Conference, Statler Hotel, Washington, D. C., June 23-26.



50-YEAR CERTIFICATES were awarded by Nema to H. T. Bussmann (left) and C. E. Johnson

Forecasts Business Stability

Economist tells Nema winter meeting that a new round of inflation is not in prospect for the months ahead

A new round of inflation is not now on the horizon, Martin R. Gainsbrugh, chief economist, National Conference Board, declared at the recent winter meeting of the National Electrical Manufacturers Association.

Stability in business for the months ahead was forecast by Gainsbrugh because of important adjustments that have taken place in the private sector. "We are nearer now to a general price correction than we have been since Korea," he said. "But the squeezed condition of manufacturing margins and retailers' margins still casts some doubt on how much of a correction can be expected in the near future. And advancing income in the defense sector does not loom large in the light of the stability of income in non-defense business, which outnumbers it five to one."

Outlook Improves . . . Gainsbrugh said the outlook for the post-defense period has begun to improve significantly. The private sector has already had a full year of adjustment in which to digest post-Korean excesses. At the same time it has apparently also begun to negotiate a transition from the over-stimulated post-World War II economy. The stretchout of defense suggests that support for the private sector from this source may continue at high levels for at least two years more, he added.

Seventy-five section, group, and committee sessions were held during the association's winter meeting. One of the highlights was a symposium on the problems involved in the connection of aluminum conductors to electrical equipment. A great deal of interest was shown in this meeting because the need for more information on this subject by all electrical manufacturing groups.

Gift Campaign . . . The Electric Housewares Section reported strong participation in the 1952 Electric Housewares Gift Campaign which has as its motto, "Electric Housewares—First Choice for Every Gift Occasion."

It also was reported that 100,000 copies of the industry's Spring Retail Sales Plan Book were mailed recently to dealers, distributors, power companies, and other interested persons.

The Farm and Home Freezer Section unveiled one of its new 1952 projects—a visual aids program for use by home economists. A new book entitled "A View of '52" was shown which describes and illustrates all NEMA Major Appliance Sections campaigns for 1952. This book will be distributed to the industry.

During the meeting Nema awarded gold certificates for half a century of service to the electrical manufacturing industry to Harry T. Bussmann, vice president, Bussmann Manufacturing Co, a division of McGraw Electric Co, St. Louis, and Carl E. Johnson, chairman of the board of Sterling Motors, Inc, Los Angeles.

Outage at Coulee

Seven generators forced off line when turbine pits are flooded. Power cuts made

Major defense industries in the Spokane, Wash., area lost all or a good percentage of their electric power the afternoon of March 14 when seven generators at Grand Coulee Dam with a capacity of 720,000 kw were forced off the line by flooding of their turbine pits.

The generators were not damaged by the flooding, which occurred when a valve was opened accidentally, according to Major S. E. Hutton, information officer at the dam.

Turbine pits for four generators in the east powerhouse and three in the west powerhouse were affected.

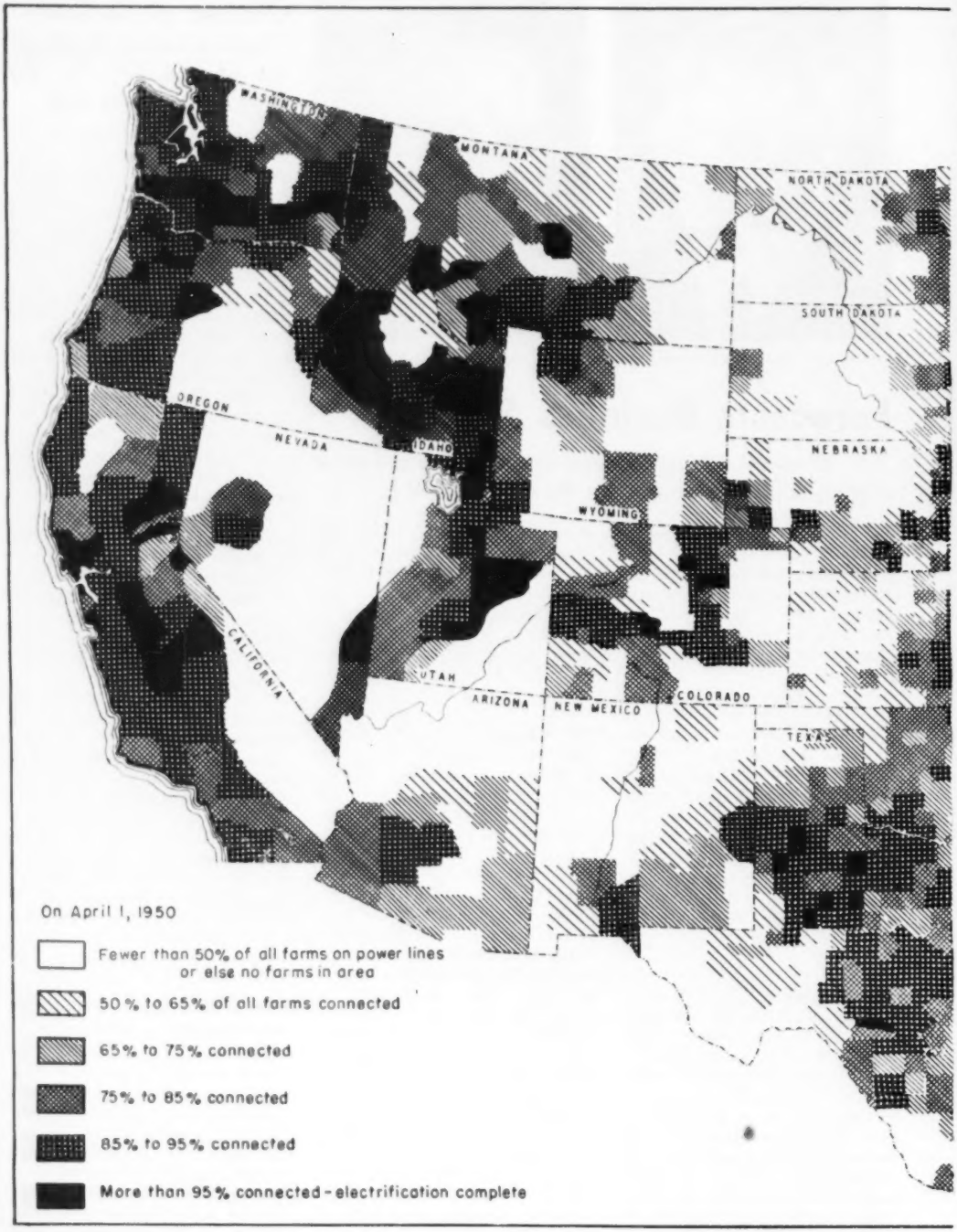
The accident happened at 11:30 a.m. and the first of the affected generators was back on the line at 4:13 p.m. Five more were in operation at 6:34 p.m. The seventh was held off for minor repairs.

Bonneville Power Administration met the resultant power shortage by cutting off all industrial power at the Mead magnesium plant and the Trentwood aluminum rolling mill, and by dropping the interruptible load to two of the aluminum potlines at Kaiser's Mead reduction plant. In addition, Northwest Power Pool operators appealed to scores of other industrial plants to cut their power requirements until service was normal.

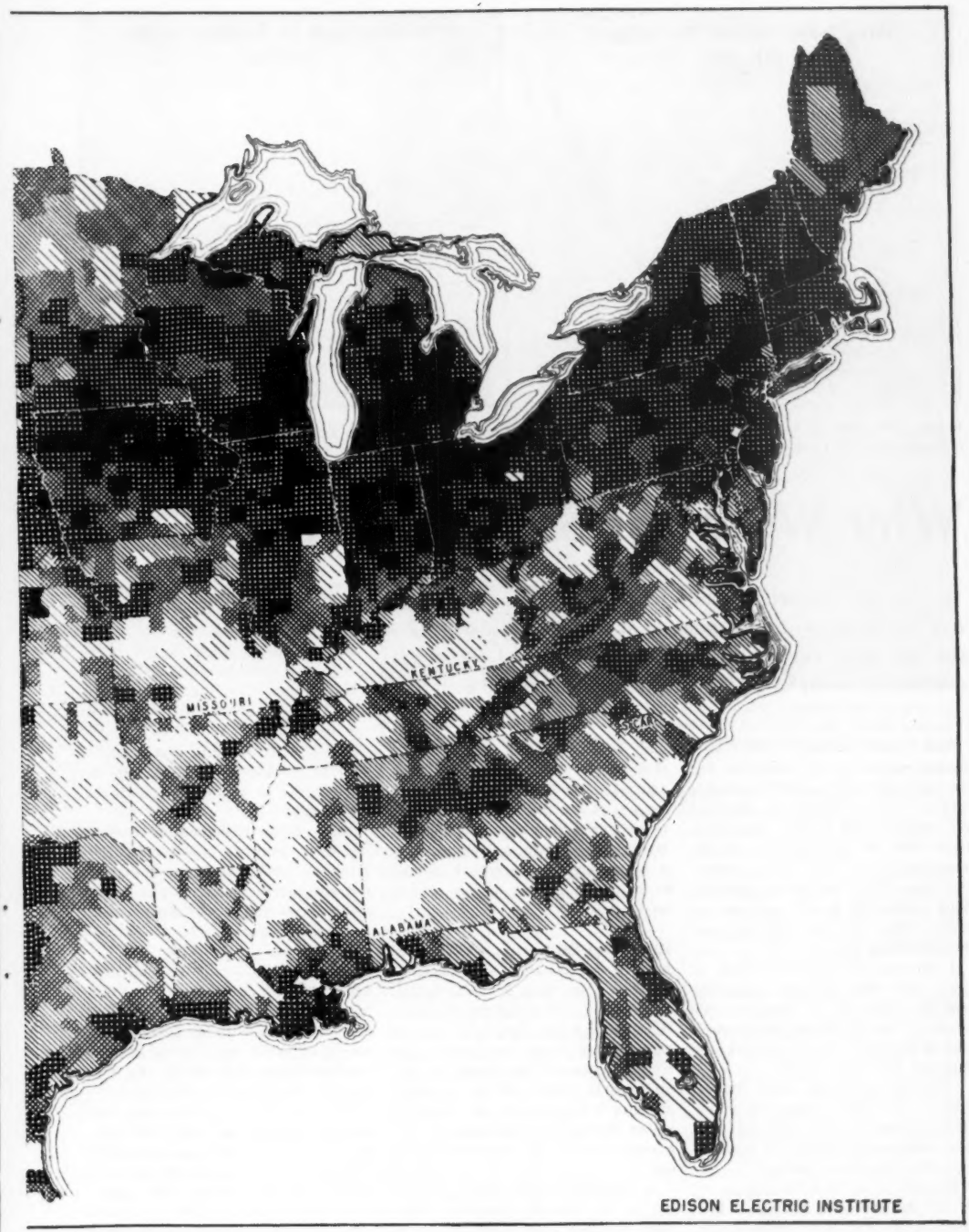
All steam plants and other auxiliary generating facilities in the Northwest were ordered into service including an 1,800 kw diesel standby plant at Washington Water Power Co's Cabinet Gorge Dam. That marked the first, though small, power contribution from the Cabinet project.

New Grant for Farm Study

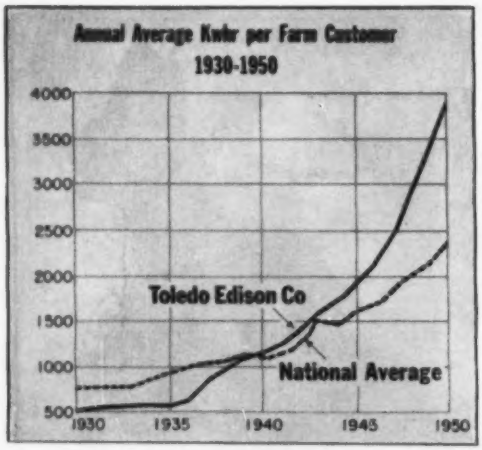
Iowa Utilities Association has offered Iowa State College a $60,000 grant to continue for five years a research program into individual farm uses of electricity. For the past five years the association and the college have cooperated in a similar research program. Results of the study now underway show that nine farms participating in the program used from 6,000 to 15,000 kwhr during 1950 compared with average use on Iowa farms served by investor-owned utilities of 2,761 kwhr.



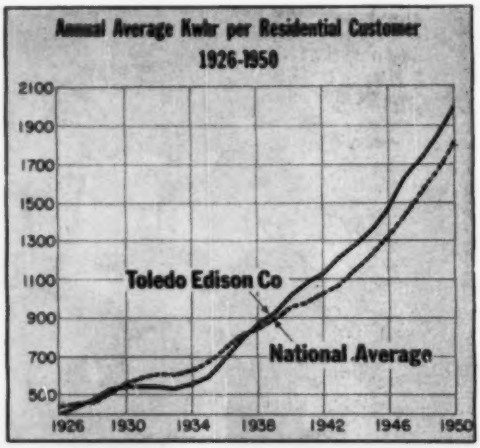
Half Century of Farm Electrification . . .



. . . has brought power to the great bulk of farm families in the United States. To note advances in the last five years, compare with map, EW, Feb. 22, 1947, p 15



FARM CUSTOMERS of Toledo Edison use more electricity than national average. 1950 usage was 20% greater than national average



ENERGY USED by Toledo Edison average residential customer has been above the national average since 1937

Why We Must Sell Appliances

A sales executive frankly tells the employees of a utility why the company, despite protests of retailers, is merchandising. He gives examples of past promotions and shows how company activities have promoted new appliances and built load

CHARLES A. HARRISON, vice president of sales, Toledo Edison Co, as reported by "Toledo News"

Our primary business is the sale of electric service to our customers, but we can't sell much additional electric service unless someone has first sold our customers the motors, equipment, light bulbs, or appliances to use our electricity. It is vital to our growth that these things be sold aggressively. Some of them we do sell, and some we don't. What is the basis of our merchandising policy?

I am sure that you, from time to time, have had someone raise the question: "Why do we compete with dealers in merchandising appliances?" One of my good friends who owns a furniture store said to me:

"You are nice folks in the Toledo Edison. But your business is selling electric service, and I don't see why you compete with me in my business by selling electric appliances."

My answer was this: "As we see it, the electric appliance business is our business. We were busy selling nearly all of the appliances long before any dealer was interested in them. You furniture folks did not start selling them until we had created such a market that people walked into your store and asked for them. We are glad to see you in our business. We are glad to see you selling lots of appliances. We want your help, but we feel that it is our business because it is vital to us in the growth of our electric service business."

Right from the Start . . . Go back a little in the history of our business, and you'll see what I mean. In the beginning it was a lighting business. When we got our plant built and our wires strung down the streets and alleys, we found that potential customers didn't rush in to buy our service. Our first job was to sell the house wiring that made it possible for the customer to use our service for lighting.

So we went out and sold house wiring because after the power lines had been installed each additional customer could be served at a very small increase in our investment.

Then came the electric iron. We could serve the electric iron in addition to the existing lighting load in each home at almost no additional investment.

Irons were available on the market. But there were few sales because the hardware dealer would just as soon sell six 50¢ flat irons as one $3.00 electric iron and it was much easier to sell the flat irons.

Market Is Built . . . We found that when we sent out salesmen with electric irons to leave in each home for the woman to use on her ironing day, we began to sell them in big quantities, and people began to go into the hardware stores and ask for them.

The same thing happened with the washing machine, the ironer, the electric refrigerator, and the electric range. We pioneered the selling of each appliance until the market was established and then the dealers came in.

Now this happened because the sale of appliances was much more important to us than it was to the dealers. We could afford to make the intensive

effort to sell new appliances. If the dealer sold an electric iron at a profit of $1.20 on a $3.00 iron, for him the transaction was ended. But for us additional electric revenue came in month after month and year after year as the iron was used.

Dollar for Dollar . . . It was in the early period when Henry L. Doherty was urging the electric utilities to promote appliance sales aggressively that he made this startling statement: He would be willing to spend a dollar on sales effort for each additional dollar of electric revenue created by it.

This was a revolutionary statement and caused quite a furor. But when you stop to figure it out, it isn't a crazy idea. If you spend $100 on sales effort this year which produces a $100 increase annually in your revenues, the revenue goes on and on, and the cost to serve the kind of appliance load Mr. Doherty was talking about is largely the cost of the coal burned, leaving a profitable margin.

Still Necessary . . . Granted that it was imperative that the utilities sell appliances aggressively in the early days, what about the present? As the market for more and more appliances developed, we got many more appliance manufacturers and dealers. Why shouldn't the electric utility rely on these folks to produce an increasing market for electric appliances in the home?

There are a good many reasons why we believe this is undesirable. Here are a few of them:

1. The average appliance dealer does not care whether a customer spends his dollar on furniture, appliances, or whatever.

2. The appliance dealer doesn't care which appliance the customer spends his dollar on—iron or washing machine.

3. The appliance dealer can't afford to spend his time and effort on appliances for which the market hasn't been developed. The utility can afford to do so.

4. The appliance dealer is interested in his margin of profit. When a sale is completed, the transaction is done; whereas the utility is much more concerned with the annual revenue from the use of the appliance.

Direct Selling More Effective . . . We know how we want the sales job done. If we do it ourselves, it will be done our way. If we don't do it ourselves, then we must get the dealer, who doesn't work for us, to do what we want done, somehow or other. We believe we can do the job more cheaply and effectively by the direct selling of the appliances.

We also believe that when we sell appliances aggressively our way, we actually do not compete with the dealers for a given volume of business but that we create a much bigger volume of business and that the dealers all get more business than if we didn't sell appliances our way. We believe the way we sell is important.

Here briefly is our policy:

Standard Goods, List Prices . . . We sell standard brand appliances at standard list prices. We give no special trade-in allowances or premiums that are not set up nationally and available to every dealer. We do not price advertising but advertise the service of the appliance. We offer no time payment terms which are not available to any dealer through his finance company.

Now when we sell under this policy, do we have a case for our contention that it is better for the dealers, for the customers, and for us as a utility company? We believe we have.

The Range Sales Story . . . During 1935, before we expanded our load building activity, our customers bought a total of 554 electric ranges from Toledo Edison and 255 ranges from the dealers. We started aggressive selling activity early in 1936 and sold 1,118 ranges in 1936. But the dealers' sales almost trebled to 675.

In 1937 we sold 1,420 ranges and the dealers 1,689, almost trebling again. Then from 1938 through to the war years we leveled off at about 800 ranges, while the dealers' sales rose steadily to 2,489 ranges in 1941. In 1950 the dealers sold 5,758 ranges

CALCINATOR, electrically heated unit for home waste disposal, is appliance for which Toledo Edison believes it must build customer acceptance. Willard Milbourne, factory engineer, demonstrates it to home economist Elizabeth Funsett, salesmen Bill Mallory and Joe Boyle

AT MEETINGS five mornings a week, company sales personnel get pep talks, technical talks by factory men, or demonstrations. Speaker here is K. K. Jorris, appliance sales manager

and we sold 1,202. Certainly these results would indicate that when we sold aggressively we did not take away sales from the dealers. Instead, the dealer sales jumped from 255 to 1,689 ranges in two years.

Lamp Sales Boosted . . . A similar result developed in IES lamp sales. These lamps had been on the market for two years when we began our sales activity in 1936. We invited the lamp dealers in for a meeting, told them we planned to promote the IES lamps, and invited them to send their sales people over for sales training. The sales manager of one of the large department stores told us he wasn't interested. He said, "We bought three IES lamps last summer, and we still have two of them. You can't sell them." A week or two after our selling program had started, he rushed over to ask what was going on. A stream of people was coming into his lamp department asking for IES lamps.

Our lamp sales jumped from 835 lamps in 1935 to 13,179 lamps in 1937. We couldn't get accurate reports on dealer sales, but the best information available indicated that the dealers sold at least 12 lamps for every one we sold.

But someone may say, "Well, the time was ripe, and sales of these appliances were going to increase anyway. We dealers would have gotten more sales if you folks hadn't taken a share."

What Happens If Selling Stops . . . Supposing we hadn't increased our selling force from almost nothing to over 100 people in 1936? Here's an example. Early in 1936, just as we were starting our expansion in selling activities, I visited several utilities, among them one that had decided a short time before my visit to discontinue all appliance selling and to rely almost entirely on the manufacturers and dealers for loadbuilding in the domestic customer classification. Incidentally, they have carried on under this policy up to the present moment.

Since this utility and our company are quite similar in size and in the nature of the areas served, it occurred to me that it would be interesting to make a comparative study of the loadbuilding results experienced over a period of years.

The two cities are about the same size. Both have fine industrial development and are in rich farming areas. Both are served with natural gas at about the same rates. The national appliance manufacturers and their dealers are active to the same degree in both areas, and all national advertising should apply equally.

So here are two cities where many of the important factors affecting domestic loadbuilding are the same except that in Toledo a highly aggressive domestic load-building program, including appliance merchandising, is being carried on by the utility; whereas the other utility is relying largely on the dealers and is doing no appliance merchandising.

The earliest year for which I had comparable data was 1937; so I made the comparison for the period 1937 through 1950, as follows:

Kilowatt Hours Per Domestic Customer

Year	Other Utility	Toledo Edison
1937	683	775
1950	1,412	2,187

EXTENSIVE APPLIANCE DISPLAYS are included in Toledo Edison's downtown office. Normal complement of salesmen on floor is eight. All 14 branch offices have merchandise displays

Selling Builds Revenue . . . This represents an increase of 683 kwhr more in Toledo for the 13-year period. At our incremental rate step of 2¢ per kwhr for our 138,250 customers, this 683 kwhr per customer represented $1,900,000 more annual revenue, presumably ascribable to the utility loadbuilding activities.

We know from analysis of the 1950 appliance sales that the customer has to buy $23 worth of appliances for each dollar of increase we see in his annual electric bill.

If our utility sales activity created an additional $1,900,000 of annual domestic revenue, it is a fair assumption that we developed through our efforts 23 times this much in appliance

sales, or a total of $43,500,000 worth of appliance sales during this 13-year period.

Dealers Sold Nearly 80% . . . Actually Toledo Edison's appliance sales total for this period was only $9,400,000. Deducting this amount we have then $34,100,000 appliance sales created for the department stores and dealers in our area.

We maintain that our activity in appliance selling stimulates the business and creates many more appliance sales than we secure for ourselves.

It is my opinion that this comparatives analysis indicates that we do create substantial sales for the dealers as opposed to merely competing with them for a given amount of business available.

But No Free Wiring . . . Another related question which I am sure you hear occasionally is: "Why doesn't the Toledo Edison Co pay the wiring costs for range and waterheater installations? Some other utilities do it."

The average retail price of the electric ranges sold last year was $233. The average wiring installation cost for a range in Toledo is about $45. So the average cost the customer must pay for his first electric range is about $278. If we pay for the installation, the price to the customer is reduced to $233, and customers will presumably buy more ranges because the price is reduced.

How many more ranges? Well, a $45 reduction on a price of $278 is 16% reduction in price. Our experience on the sales to be made from general price reductions is quite extensive over the years, and such experience would indicate that it would be quite surprising if a 16% reduction resulted in an increase of as much as 25% in sales.

Let us assume that the increase would be 25%. Then our customers would buy five ranges instead of four, and to get that one additional range we would pay for five installations at $45 each, or $225 in wiring costs which would be the direct sales expense for one additional range.

Too Much to Pay . . . This range would add about $27 per year in domestic revenue. Thus, for sales expense on installation alone, we would be spending $225 for $27 annual revenue. This represents $8.30 sales expense per dollar of revenue, quite a difference from Mr Doherty's dollar for dollar figure. Would you spend the stockholders' money on this basis?

Another question that you may hear from time to time is, "If Toledo Edison is so interested in adding revenues, why don't you promote househeating or air conditioning?"

Selective Selling . . . How we select certain appliances to promote is a long story. For each appliance the load characteristics are soon established: the kilowatt demand, the hours of use, the average hours use per year, the probable diversity. The load characteristics of all the appliances and all other electric equipment in use determines our system load factor. And the system load factor is vital in determining the efficiency and the rates of a utility.

Our system load factor was down as low as 46.5% in 1932. It went up to 64.2% during the war in 1944, due in part to the 3-shift operation of war industry. In the last three years it has been 61% to 62%, a very high load factor which we wish to maintain and improve if we possibly can do so by our sales efforts. Off-peak water heaters, blankets, refrigerators, home freezers, and other appliances with good load factors are important in this phase of our sales policy.

Size of Potential Market . . . The probable market for an appliance is an important factor affecting our interest. Will the customers buy thousands or ten thousands? We can afford to put a lot of effort behind an electric blanket which only produces 100 kwhr or $2 additional annual revenue if we see a probable market of 30,000 or 50,000 on our lines ultimately.

There are definite reasons why we actively promote ranges, waterheaters, home freezers, roasters, dehumidifiers, and driers. There are widely varying reasons why we don't actively promote television, electric househeating, and air conditioning. All loads are not equally attractive to a utility. We aim to direct the application of our sales dollars toward increasing those loads which will result in good service at low rates for our customers and which will make it possible to pay good wages to our employees and good dividends to our stockholders.

A Timely Illustration . . . The electric "Calcinator" is an item entirely new in our service area. It offers a real service to the householder. It's economical to use. It disposes of household trash and garbage by calcination which, according to Webster, is the process of reducing to ash by heating. Most of the heat is furnished by the oxidation of the contents, but the process is started and kept alive by the automatic turning on of a 600-watt heating element for short periods three times a day.

Without the kind of promotion the Edison sales force can give the "Calcinator," it is probable that it would be a long time making a dent in the Toledo market. People have to be told what it will do for them and how much it will cost to operate. They have to be convinced that it fills a need at a price they can afford and will pay.

Edison will do this job of promotion by advertising, door-to-door calls, radio spots, and bus cards. Once the "Calcinator" gains acceptance, Edison will turn its attention to some other promotion.

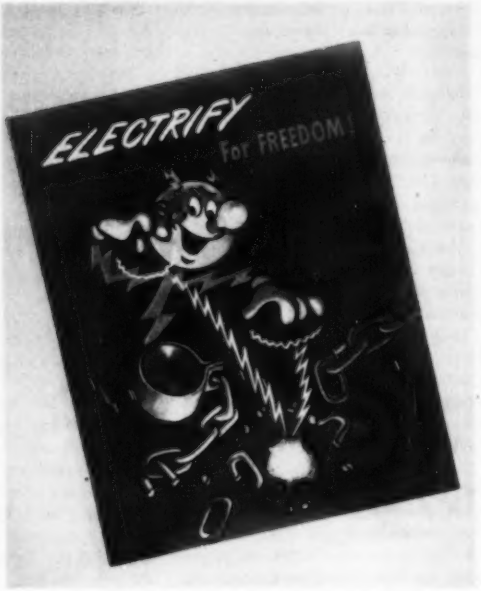
Meanwhile, we will have created a new use for electricity and built an additional load for our lines. Over the years we will get back the investment made in promoting this new appliance. When it becomes a common item of household use and many appliance dealers are handling it, we will have accomplished our job of selling it.

BABY just naturally had to get into the picture, but the important man actually is the service man who is checking to see that the new stove will operate properly. Company services appliances without regard to brand or where they were purchased

Sets Selling Sights High

Anticipating fair supply of goods and materials for a reluctant market this year, Pennsylvania utility plans aggressive sales program pushing free enterprise

J. M. STEDMAN, General Sales Manager, Pennsylvania Power & Light Co, Allentown, Pa.



PLANNED ACTIVITIES in residential, farm, commercial, and industrial sales and in area development were integrated into the basic theme

To sell more of the company's service, to improve relations with customers, and to promote the American free competitive enterprise system are the three equal objectives of the 1952 sales program of the Pennsylvania Power & Light Co. Again, as in 1951 and in 1950, these objectives and the means toward their attainment are set forth in detailed plans covering the fields of residential, farm, commercial, and industrial sales and of area development.

Emphasis on Cooperation . . . Although the company merchandises major appliances, heaviest emphasis in the plan for residential sales promotion continues to be on cooperation with dealers, distributors, and other sales allies. Included in this cooperation are company advertising in newspapers and other media; sponsorship and participation in displays in salesrooms, windows, fairs, shows, and exhibits; group demonstrations of appliances; movie showings and talks; promotion of electrical living and adequate wiring to home builders; all-electric kitchen and laundry planning services; program to promote modernization of homemaking teaching facilities in local schools. In addition to these, new approaches to market development are being considered. As they develop, these ideas will be put into action.

Anticipating a reasonably plentiful supply of appliances in 1952, sales quotas were set only a little under actual sales in 1951. These quotas are ranges, 22,000; water heaters, 14,000; home freezers, 12,000; dishwashers, 3,000; clothes dryers, 5,000. No quota was set for refrigerators. They are regarded as having complete public acceptance.

★

After the theme of the program was decided on, each sales department manager drafted an outline of his group's projected activities. In staff discussions, these were edited and integrated into a complete program which was printed and distributed in the company and to sales allies.

★

Results from PP&L Sales Activities

Class of Service	Average Number of Customers 1951	Average Yearly Use per Customer 1951	Average Use per Customer Increase over 1950	Sales Personnel
Residential & Farm	459,719	1795.9 Kwhr*	195.1 Kwhr	170
(Farm only)	35,740	3728.8	434.6	—
Commercial	65,993	7003.8	414.9	63
Industrial	4,403	—	—	44

* Projected for 1952–1988 kwhr

Sale of Major Appliances

Appliance	Number Sold 1950	Number Sold 1951	Number Sold per 1000 Residential and Farm Customers 1950	1951	% Inc.
Ranges	25,061	22,992	56	50	−10.7
Water Heaters	11,260	14,279	25	31	24.0
Freezers	10,246	13,210	23	29	26.1
Automatic Washers	13,183	14,437	29	31	6.9
Laundry Dryers	2,184	4,240	5	9	80.0

Commercial Electric Cooking

Additional Kw Connected 1950	1951	Total Connected Kw per Customer 1950	1951	% Inc.
9,653	10,284	7.6	9.8	28.9

Area Development

	1951	1949/51 Inc.
New Industries Located	97	109
New Jobs Created	9,411	21,256
Potential Additional Payroll	$26,350,800	$59,516,800

Close Touch with Farms . . . In farm service promotion, largest part of the work will be done by six supervisors and 31 farm representatives in individual and group contacts with farmers, equipment dealers, county agents, extension workers, and others. The representatives will call on each of their assigned farm customers at least once in the year and on equipment dealers several times. Their activities will be backed up by mailing of periodicals and other literature to farm customers, advertising, studies of farm electric operations, distribution of the EEI electrical equipment handbook, cooperation with youth groups, movies, and talks.

In 1952 a program will be started by which recognition will be given to "all-electric" farms by designating them as Reddy Kilowatt farms. Minimum requirements for qualification as all-electric are set for the farm home and for dairy, poultry, and general farms. RK farms will be identified by an appropriate and attractive sign. When a farm qualifies, a ceremony of recognition attended by agricultural leaders, company representatives, and others will be held.

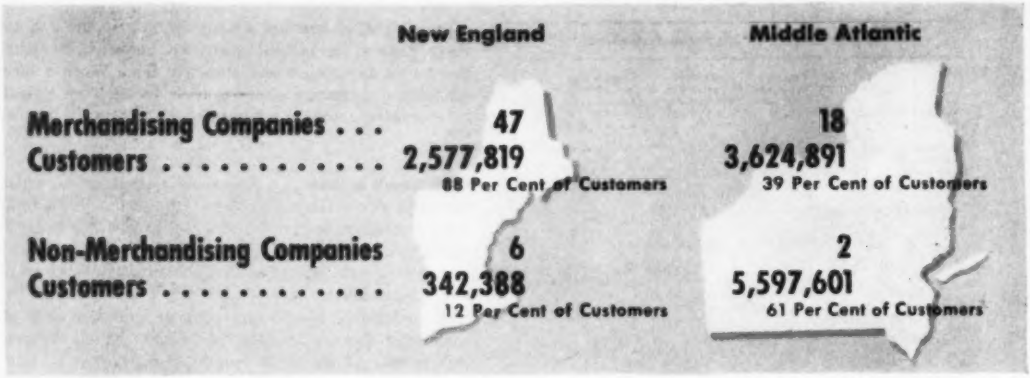
Calls Result in Sales . . . That is the foundation on which the 1952 plan for commercial sales is erected. Each company representative in this field will contact 1,200 to 1,400 customers. Promotional efforts will be concentrated on competitive services, and special attention will be given to low-use customers.

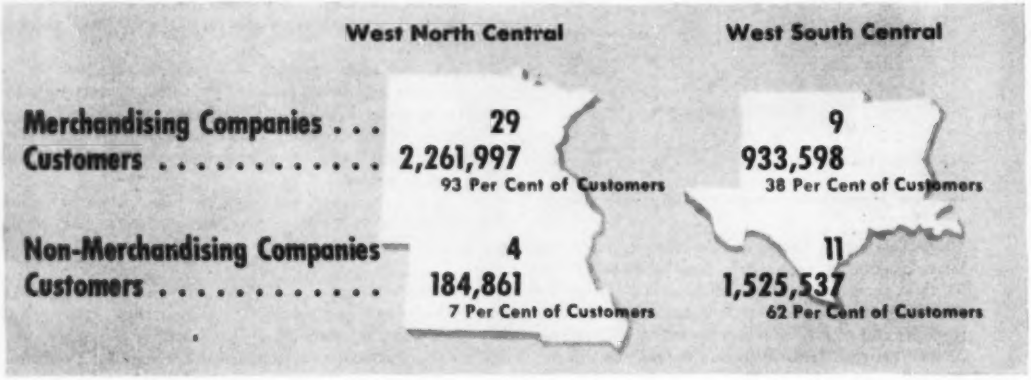
A continuous commercial cooking campaign will be carried on January through November. School lighting will be pushed for three months, January-March; store lighting, five months, April-August; air conditioning, three months, May-July. Local equipment shows, floor displays, and trial installations on customers' premises will again be featured.

A permanent commercial electric kitchen will be installed in a company building for demonstration purposes. To supplement dealer and distribution stocks and expedite deliveries, the company maintains a stock of heavy-duty and counter-line cooking equipment which can be drawn upon as needed.

Additional load of 28,000 kw with estimated annual revenue of $1.3 million has been set as the goal of the commercial sales program.

Industry's Helper . . . Helping industrial customers to increase output per man-hour, locate scarce materials and equipment, negotiate defense contracts, and keep informed on new production developments is the aim of the industrial sales program. This will be done by mass sales promotion, including meetings, promotional literature, and the like, and by "Planned Sales Presentations" to individual customers. Of these presentations a quota of 2,016, involving new revenue potential of at least $1.5 million, has been set for 1952. To realize this quota a minimum of 16,800 sales calls is anticipated. These calls will be scheduled so that each industrial customer will be visited at least once during the year.





Two to One—Merchandising Vs

Merchandising companies serve 55% of all customers served by companies having 5,000 meters or more

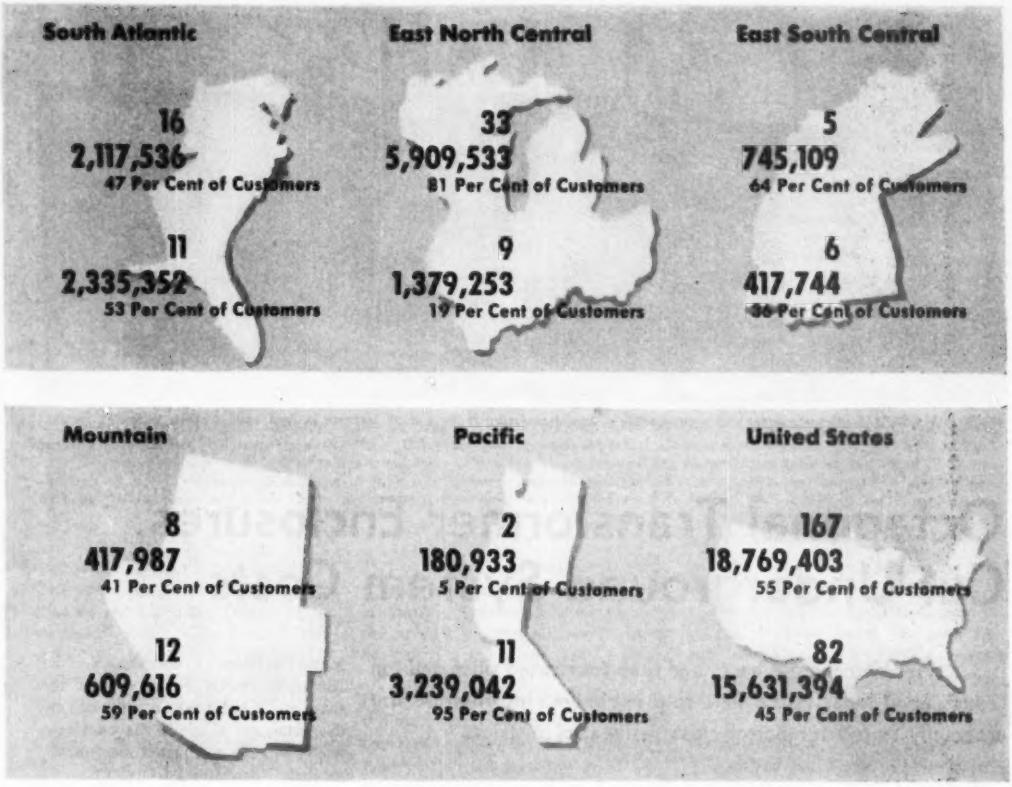
More than two thirds of the power companies in this country which have 5,000 customers and above merchandise appliances. Electrical World compiled a list of such companies, queried all of them and received replies from all. The score is: 249 companies—167 merchandise, 82 do not.

The 167 merchandising companies serve 18,769,403 customers. The 82 non-merchandising serve 15,631,394. It was interesting to observe, during the compilation, that three of the non-merchandising companies serve one-third of the customers of that group. If these three companies had been among those selling appliances, the ratio of merchandising to non-merchandising companies would not have been greatly different from the two to one above. But there would have been a big change in the numbers of customers served by the two groups. Instead of 18,769,403, the figure would have been 23,800,689 and customers served by non-merchandising companies would have dropped from 15,631,394 to 10,600,-108.

Because of the numerous qualifying factors involved—climate, distribution of population, habits of living, levels of income, competitive services, etc—that differentiate one region of the nation from another, it is perhaps unwise to attempt the establishment of any direct relationship between power company merchandising or non-merchandising and volume of appliance sales. However some of the data presented here do show an interesting situation when lined up with figures from the January, 1952, issue of "Electrical Merchandising."

The West North Central and West South Central regions (see above) have about the same number of customers. In the northern area 29 of the 33 companies sell appliances, 88%. In the southern, only 45%, 9 out of 20, do so. Now look at the respective WNC and WSC percentages of national totals of appliance shipments by manufacturers to the two regions, as published in "Electrical Merchandising":

Washers, 9.21, 7.7; Ironers, 10.58, 5.75; Dryers, 11.09, 2.99; Refriger-



Non-Merchandising Power Companies

ators, 9.46, 9.04; Ranges, 8.63, 3.61; Water Heaters, 11.59, 2.1; Freezers, 15.92, 12.22.

These percentages show the northern region substantially higher than the southern in sale of appliances, particularly of laundry dryers, ranges, and water heaters. It may not be said unequivocally that the reason for this is the much higher proportion of merchandising companies in the northern region. But one cannot avoid suspecting that the figures indicate some relationship between utility merchandising and volume of appliance sales.

In answer to the question, "Do you have a dealer cooperative program with a dealer contact force?" 170 companies replied they did. Advertising in cooperation with dealers was reported by 165, and 120 belong to an electric league.

Among the 82 non-merchandising companies, 66 have dealer cooperative programs, 56 do cooperative advertising, and 44 belong to electric leagues. No cooperation with dealers was reported by 19 of these companies. Of the 167 merchandising companies, 33 reported no such cooperation.

Companies Classed by Appliances Sold and Displayed and by Cooperation with Dealers

	Merchandising Companies Classed by Appliances Sold			Non-Merchandising Companies Classed by Appliances Displayed			Companies Classed by Nature of Assistance to Dealers Elec. League		
	Companies	Major	All	Major	All	None	Co-op Program	Cooperative Advertising	Member
New England	53	2	45		3	3	30	29	31
Middle Atlantic	30	7	10	3	7	3	18	19	8
South Atlantic	27	4	12	3	5	3	17	21	11
East North Central	42	4	29	4	3	2	31	32	18
East South Central	11	2	4	1	3	1	10	10	5
West North Central	33	5	24		2	2	21	23	22
West South Central	20	1	8	2	9		18	13	4
Mountain	20	2	6	2	7	3	14	13	14
Pacific	13	1	1	2	6	3	11	5	7
United States	**249**	**28**	**139**	**17**	**45**	**20**	**170**	**165**	**120**

BRICK WALL INSETS are large enough to accommodate a second enclosure if there is an increase in load or if 3-phase service is required

Octagonal Transformer Enclosures Cut Underground System Costs

Precast concrete bases and shop-fabricated sides and top reduce hand labor in the field to a minimum. Installations are especially suited for better-class residential districts

C. N. PARKER, Underground Engineer
C. B. ANDERSON, Assistant Underground Engineer
California Electric Power Co, Riverside

Using octagonal concrete bases and metal enclosures for transformers is one of the ways California Electric Power Co reduced the cost of installing underground distribution in a better-class tract at Palm Springs. Like other "low-cost" underground systems, this one uses more but smaller transformers in semi-buried enclosures, with primary and secondary cable in fiber or other non-metallic conduit.

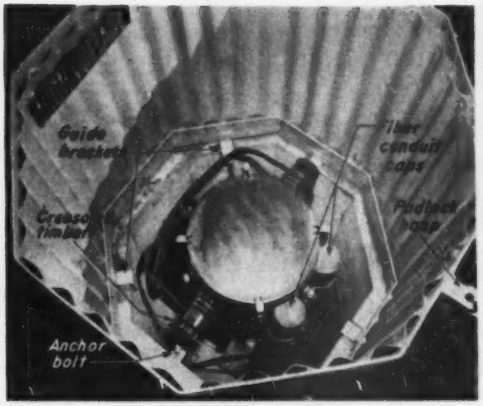
While the utility has installed over ten miles of residential type underground in the Palm Springs District, the rapidly increasing cost of labor, high cost of transportation from the metropolitan area, and high resort area prices have made the cost of underground construction excessive. By the use of shop-fabricated transformer enclosures, pull boxes, and duct material, hand labor at the job site was reduced to a minimum. The cost has been reduced by from 30 to 50%, and a greatly reduced amount of copper cable is needed.

Octagonal Castings . . . Major innovation in the system is the use of an octagonal concrete base and octagonal corrugated sheet metal enclosure with a removable sheet metal top. In planning underground distribution for residential areas a small utility has the problem of spreading over a relatively few units the cost of forms and other fixed charges. In this case it was found that for the small number of bases required, simple plywood forms for the octagonal shape would save some $300 over the steel mold required to cast a circular base. Using the plywood forms, octagonal bases cost $115 each installed in lots of six. Since 24 enclosures are planned for the devolpment in the first area, the savings on the form alone are appreciable.

Metal Enclosure . . . Fabrication of the corrugated metal enclosure and the sheet metal top are also simplified by the octagonal shape. The enclosure is of 24-gauge corrugated sheet metal, formed, galvanized, and painted locally. Welded brackets locate it properly and provide a means of anchoring it to the concrete base. The octagonal cover is a very flat pyramid made of 12 gauge sheet metal, pressed in two halves and welded together, a much simpler operation than forming a circular cover with a curved top. It is locked in place by two dowel pins on one side and a hasp and padlock on the other. One man can easily remove it for inspection or to reset the transformer overload breaker. The installed cost of the entire transformer enclosure is approximately $160.

Transformers . . . Overhead transformers with internal fuse short circuit protection and circuit breaker overcurrent protection in sizes from 5 to 50 kva, 2,400–4,800/120–240 v, fit the enclosures. Loading conditions may average 3–4 kw per customer, including electric space heating, which is popular in the desert area. Primary bushings are the protected terminal type, and secondaries have a stranded copper bus attached to the terminal. Services are attached to the bus by

OCTAGONAL CONCRETE BASE precast with plywood forms proved cheaper than a circular base requiring a steel form. Octagonal enclosure of corrugated sheet metal, riveted to upper and lower 3/16 x 4-in. rings to provide ventilation, is fastened by wing nuts to bolts cast in base. Dowel pins hold one side of top; padlock holds the other



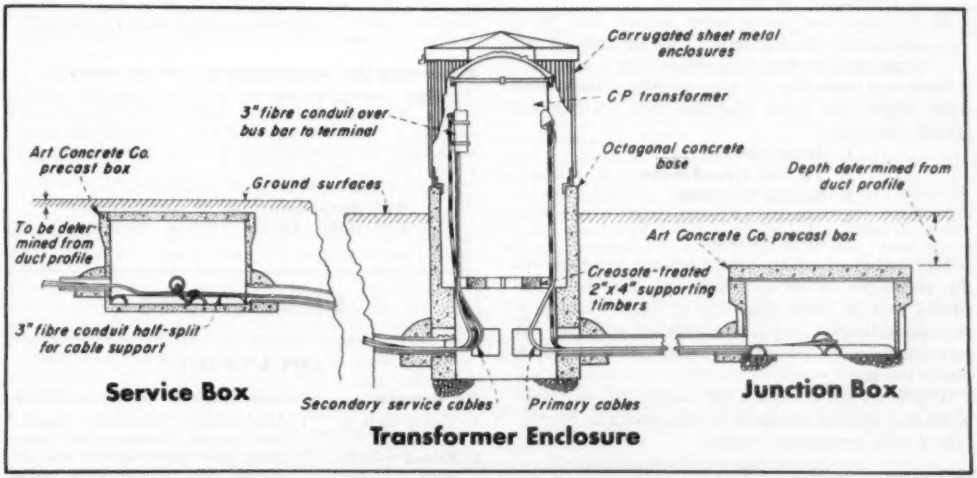
FIBER CONDUIT CAPS protect secondary connections on the standard current protected distribution transformers. Overload breaker built in the transformer can be reset after removing the top of the enclosure, an operation which takes but a few minutes. The transformers now installed are 5 to 50 kva, 2,400-4,800/120-240 v, single phase

split-bolt connectors, protected by a fiber sleeve which is slipped off when changes are required. Design of the enclosures provides for external indication of transformer overload by extension of the overload warning circuit to a buzzer on the enclosure.

Cables . . . Shielded 5-kv synthetic insulated primary cable and 600-v thermoplastic-insulated secondary cables are run in duct buried about two feet, depending on the terrain. The duct is 3-in. diameter for primary, 2-in. diameter for secondary. Type 2 fiber or Transite conduit is used except at street crossings where Type 1 fiber or Transite Koreduct in concrete give the added protection necessary. Duct lines carry a 1% grade to drain points

Other Features . . . Creosote-treated timbers resting on ledges cast in the concrete base support the transformer. Also cast in the base are eight ½-in. thick knockouts, providing entry and exit combinations to meet any arrangement of primary and secondary circuits. Bottom of the enclosure is completely open and filled with loose gravel to provide good drainage and protection against rodents.

As a move toward further economy, precast concrete boxes are used for primary and service junction boxes. Primary boxes have a reinforced concrete cover and save about $250 each compared to the traffic reinforced type previously used. Service boxes have bottom and lower sides precast in one piece with the interlocking upper sides and collar supporting the single-piece, reinforced cover. Knockout sections are cast in all four sides of the box, and handles are inserted in the cover.



PRECAST CONCRETE BOXES used for primary and service junctions keep hand labor in the field to a minimum. Knockouts provide flexibility

Business Methods Apply To

Meter Testing and Maintenance

E. H. TYSON,
Pennsylvania Power & Light Co, Hazelton, Pa.

The return on money spent for the maintenance and testing of residential and small power meters has been a cause of concern for a long time. Today wages and the cost of new meters are rising sharply. It is more than ever imperative to ask: "Do modern business methods offer a way to cut the cost of meter testing and maintenance?"

The meter department of Pennsylvania Power & Light Co has found that the answer is "Yes."

This article illustrates how meter work of PP&L was analyzed to point the way to desirable changes in methods.

The problems to be faced were not particularly new:

A. Many meters were installed where it takes longer to get to them than to read them.

B. Meter testers, working at meter locations, were actually testing only a small part of the time. The rest they spent carrying, packing, and unpacking equipment, hunting addresses, and doing other non-productive tasks, all of which were below their work grade.

C. Although much time and effort had been spent to cut a pound or so from the tester's equipment, he was still unable to carry enough parts and apparatus to do the good maintenance job required by today's heavier service conditions and longer test period. Despite a 400% increase in wages, he still cannot test an appreciably larger number of meters than he did in 1910.

D. Elaborate and costly meter records had to be maintained although most of the information was duplicated on other company records.

These are only four of the problems. There were many others. But taken altogether they fell into five general categories:

1. **Meter locations**
2. **The best type of meter**
3. **Method of testing**
4. **Methods of maintenance**
5. **Meter records.**

The method of solving these problems was this: All the advantages of the competitive practices being examined were set down, regardless of sacred tradition or personal inclination to defend established methods. The preponderance of advantages usually showed which course was best.

Without further discussion the analysis that was made of the five problem categories is summarized as follows, along with conclusions reached.

Footnote: Based on a presentation before the Meter Committee of the Pennsylvania Electric Assn

1. METER LOCATION

ADVANTAGES

Indoor	Outdoor
1. Testing can be done in all weather	1. Customers prefer meter outdoors
2. Need not be water tight	2. Accessible for reading and testing
3. No extreme temperature changes	3. No call-backs for reading or testing
4. Less liable to damage	4. Cost of reading much less
	5. Less annoyance to customer
	6. Practically no diversion
	7. Decreases accidents due to poor meter locations
	8. Good visibility at all times
	9. Locations not subjected to vermin or contagion.

In reference to the advantages of indoor meters:

1. There are enough indoor meters so that routes can be made up of all indoor meters and held for days when weather is bad.

2. If gaskets on outdoor meters are kept in good condition or sealing compound used where necessary, moisture effects become negligible.

3. Temperature compensation of the modern meter eliminates this angle.

4. Experience has shown damage to be negligible on outdoor meters.

The advantages point clearly toward outdoor installations.

2. BEST TYPE OF METERS

ADVANTAGES

"A" Base	Socket
1. Test can be made without moving meter	1. Lends itself to outdoor use
2. Test jack not required	2. Easier to install and remove
	3. No permanent test facilities needed
	4. Fewer connections
	5. Discourages diversion
	6. Cheaper installation
	7. More compact installation
	8. No handling of live wires
	9. Easier to repair
	10. Permits more detailed examination

Regarding the advantages of A-Base meters:

1. When installing a meter, one previously tested from the shop is used. A 60-day inspection is made, and the meter remains in service for a full test period. This is no different from removing a meter and installing it in a test jack or returning it to a shop.

2. No test jack is needed under a change method.

The preponderance of advantages definitely favor socket meters.

3. METHOD OF TESTING

ADVANTAGES

On Premises	Change and Test in Central Shop
1. Test is made in place	1. Ideal working conditions, temperature control, automatic test equipment, labor saving devices and production line methods of a central shop
2. Record work, other than test data, is small	

3. Shipping or handling charges for meters to the shop only applies to defective meters

2. Complete maintenance possible
3. Complete supply of repair and replacement parts available
4. Closer supervision with fewer supervisors
5. Complete insulation check (10% of meters removed found to have defective insulation)
6. Low power factor accuracy check
7. Promotes longer test schedules
8. Removes hazardous meters from service
9. Reduction of costs with large volume of work
10. Simplifies conversion of "A Base" meter to socket type
11. Reduces investment in and gives better control of field testing equipment
12. Meter change cannot be "curbstoned"
13. Easier for field testing to keep to schedule without excess man power
14. Cost and time factors in training personnel are less
15. Less time on customers' premises
16. Use available personnel of other departments for making changes
17. Meter readers can make changes in rural territory
18. Less transportation of personnel
19. Improve employee relations by eliminating the dead-end job of single-phase tester
20. Meters of proper capacity are installed as load changes with no additional expense
21. Field supervision almost eliminated
22. Minimum equipment carried by field men
23. Corresponds to methods of servicing gas, water, and steam meters and telephones.

In reference to advantages of testing on premises:

1. Need of testing in place is emphasized. Experience proves transportation does not affect a meter. The rotating standard, used to calibrate meters, is in constant transportation and frequently receives rougher treatment than a meter which is packed in a shipping carton only once.

2. Record work under the change method is not as large as it may seem. It is certainly more than is involved in testing on premises. Several means have been found of reducing the amount of record work.

A group service order is used which covers 30 customers, and entries are made by listing the customers according to numerical sequence of folio number from the meter reading book. When the change method was being set up, it was planned to change meters on regular reading days in order to not interfere with machine billing. However, a system can be found which allows the meter to be changed at any time. Here is how it is done:

The Group Service Order carries the finish reading of the old meter and the start reading of the new meter (usually zero). In processing the GSO the work order clerk calculates the kwhr consumption from the time the meter was last read to the time the meter was changed and subtracts this from the start reading of the new meter. The reading thus obtained is then entered on the GSO under "Central Billing Reading." When Central Billing processes the GSO, a new billing card is prepared, and the adjusted reading entered as the start reading. Changes must be scheduled far enough ahead of regular reading dates to prevent interference with billing and so no one billing clerk is overloaded. Use of a machine system for meter records will materially reduce the amount of record work.

3. Decrease in transportation and lost time charges for meter testing personnel more than offsets shipping and handling charges.

The weight of advantage is very definitely toward the change method

4. METHODS OF MAINTENANCE

Shop Work on Single Phase Meters

ADVANTAGES

Complete Repairs by One Worker

1. One man responsible for job
2. No intermediate handling
3. Does not require a large volume of work

Production Line Repair

1. A large part of work can be broken into simple operations
2. Each operation can be classified according to skill required
3. Minimizes training because it is in simple steps
4. Lends itself to large changes in volume of work
5. Uses employee best suited to each operation
6. Supervision can be focused on more detailed operations
7. Inspection at all desired points
8. Use devices and jigs to improve workmanship and save time
9. Easier to analyze and improve time of each operation
10. Workers can be shifted to pick up an operation temporarily bogged down
11. Minimum of repair parts required at each operation
12. Corresponds to methods used for other shop work of somewhat similar products.

NOTE: Workers can be kept on proper grade of work a high proportion of time

Regarding production line repair

There must be sufficient volume of meters to justify a production line. Several trial runs by PP&L developed know-how and demonstrated beyond question that production line repair produced more uniformly better work at lower cost. This method was therefore adopted.

5. METER RECORDS—MACHINE SYSTEM

A study is now being made by PP&L of the merits of a regular meter department record system as compared with machine records. Here is the picture as it seems to be at present.

The machine record center carries all the essential meter location data such as customer's address, folio numbers, installation data, etc, taken directly from the service orders. With the change method of testing, the date of installation is within a very short period of the date of the last test and, therefore, no additional date is needed in the machine record.

At stated intervals, probably once or twice each year, the machine record center runs off a list of meters coming due for test, taken from the dates of installation. This list shows customer's address, folio number, and meter data. Local forces then originate the Group Service Orders for meter changes.

The Central Shop keeps a single copy Shop Test Slip of all meter tests, as the PUC requires. This is the only record of the meter accuracy. When a test is made in the field, such as a complaint test, the results of the test are entered on a Shop Test Slip and forwarded to the Central Shop for filing.

The method appears to have the advantages of greatly reducing the handling of service orders, reducing transcription and errors arising therefrom, and minimizing the duplication of records.

Experience with this method of examination and practice has demonstrated:

1. Methods become simpler and more effective
2. Better coordination of work into an overall efficiency
3. More alert and capable supervision

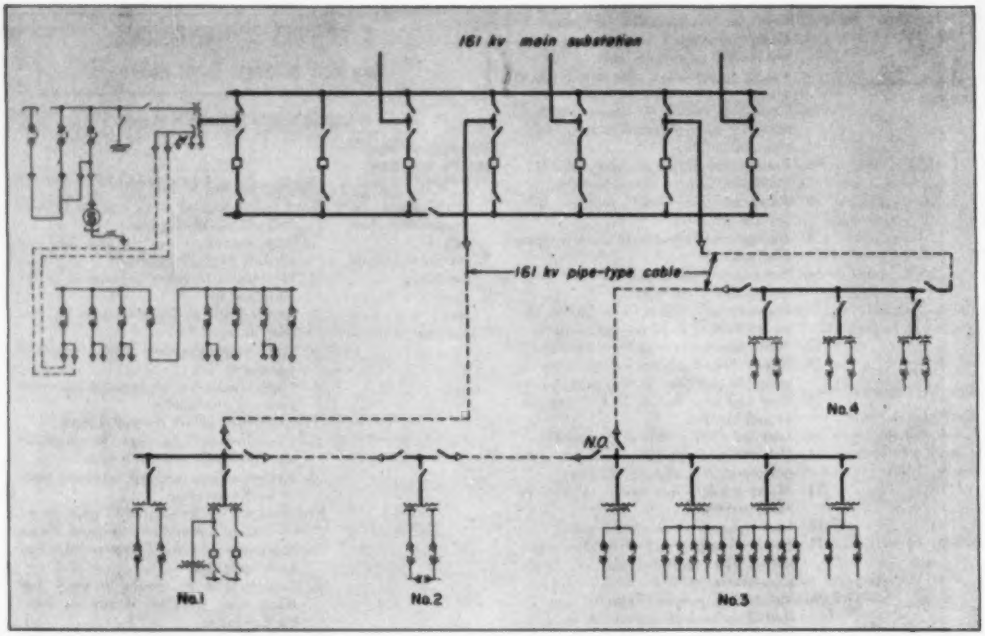


FIG 1—SUPPLIED through 161-kv main substation, pipe-type cable feeders serve test facility substations 1, 2, 3 and 4. One transformation is saved by continuing at supply voltage to substations. Main substation also includes a power transformer to supply a synchronous condenser. Selection of underground feeders was prompted by the continued movement of large aircraft components during testing operations

161-kv Pipe-Type Cable for Air Force

One of the first installations of high-pressure, pipe-type cable, for operation at a nominal voltage of 154 kv, is being made for the United States Air Force at the Arnold Engineering Development Center in Tennessee. Several pipe-type cables are in operation in the United States at voltages up to 115,000 and 138,000. In Europe operation has been successful at still higher voltages. But only in recent years has consideration been given in the United States to operating such cables at voltages higher than 138,000. Sverdrup & Parcel, Inc, St. Louis, are the consulting engineers for this cable installation which is rated at 161 kv.

Design Criteria . . . Demand studies for various components of the Center indicated that maximum power requirements would be approximately 300,000 kva. Location of the Center dictated a power supply of 154 kv. Arrangement of the test facilities of the Center were such that a main substation was required for receiving the power supply from the transmission system with feeders to four major substations at the test facilities. Selection of 154 kv as the nominal feeder voltage eliminated one transformation.

The one line diagram, Fig 1, shows major components of the 154-kv electrical circuits. The 161-kv underground system is shown by dashed lines. The main substation, located near an edge of the Center, serves as a termination point for the overhead transmission lines from the power system and includes a power transformer to supply a synchronous condenser and loads other than those at the test facility substation. Selection of underground feeders was prompted by the continual moving of large aircraft components during testing operations. No overhead lines were permitted between the main substation and the Test facility substations, Numbers 1, 2, 3, and 4 in Fig 1.

Evaluation of first cost, annual fixed charges, losses, and maintenance for several alternatives resulted in selection of the pipe-type cable for these underground circuits. Voltage regulation was an important factor in the analysis, particularly from the standpoint of double transformation with a sub-transmission voltage, vs 161-kv feeders and a single transformation to the utilization voltage. These studies resulted in selection of the system as schematically shown in Fig 1, including the installation of 161-kv pipe-type cable circuits between the main substation and the test facility substations. The total circuit length of this installation is approximately 8,000 ft.

General Design . . . The pipe-type cable is rated at 161 kv, for use on a system with a nominal voltage of 154 kv, effectively grounded neutral. Although advantage was taken of reduced insulation level, one class, on transformers, full 161-kv Class insulation was maintained

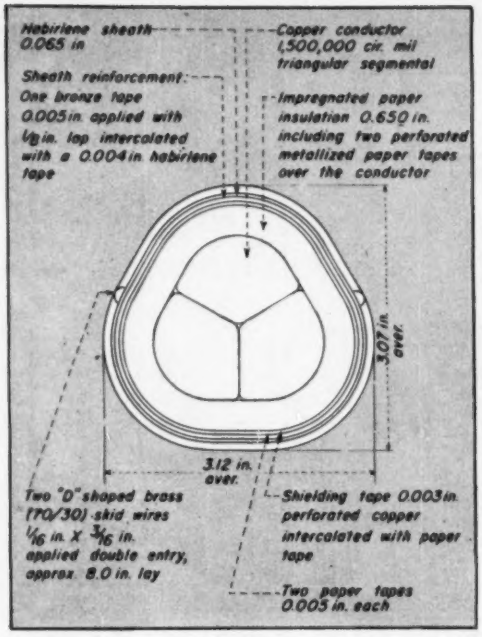

Habirlene sheath 0.065 in
Sheath reinforcement: One bronze tape 0.005 in. applied with 1/8 in. lap intercalated with a 0.004 in. habirlene tape
Copper conductor 1,500,000 cir. mil triangular segmental
Impregnated paper insulation 0.650 in. including two perforated metallized paper tapes over the conductor
3.07 in. over.
3.12 in. over.
Two "D" shaped brass (70/30) skid wires 1/16 in. X 3/16 in. applied double entry, approx. 8.0 in. lay
Shielding tape 0.003 in. perforated copper intercalated with paper tape
Two paper tapes 0.005 in. each

FIG 2—CABLE is single conductor, triangular segmental, 1,500,000 cir mil, 161-kv oil-type compression cable

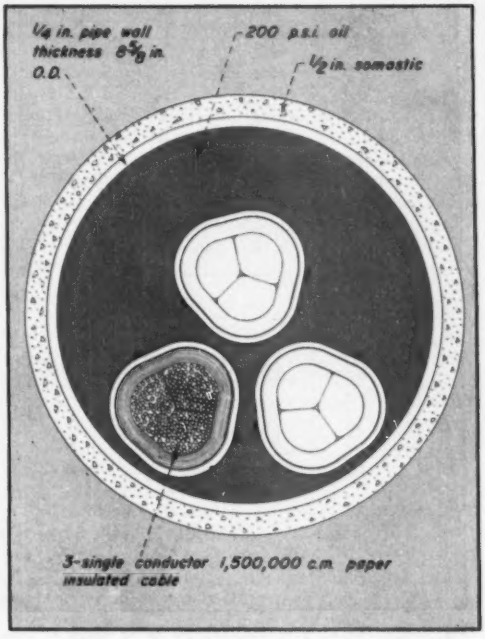


FIG 3—ARRANGEMENT of three single-conductor cables in pipe is shown by typical cross section of pipe

One of first installations at this voltage in the United States. Characteristics include permanent polyethylene sheath. Oil pressure system is constantly supervised.

D. P. AYERS,
Assistant Head Electrical Engineer, Sverdrup & Parcel, Inc, St. Louis

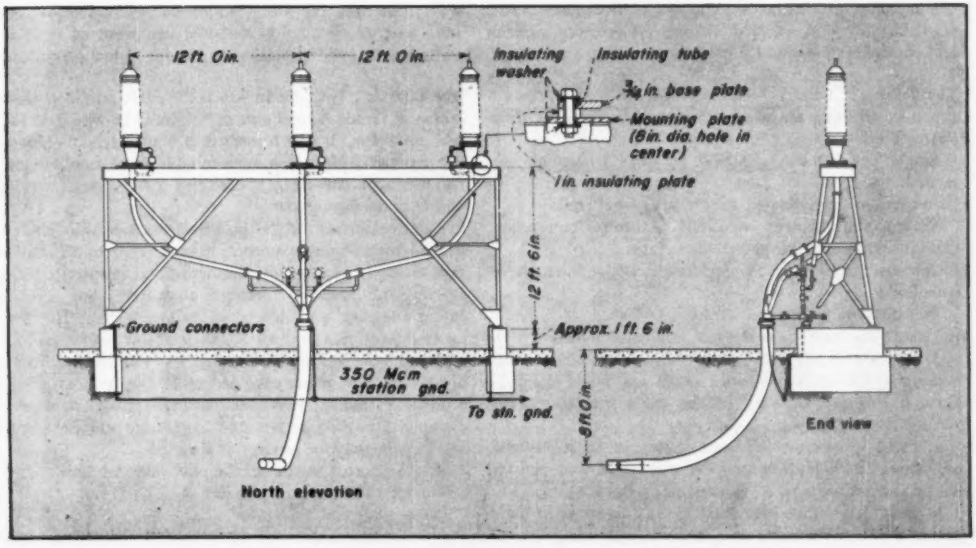


FIG 4—CABLES were terminated above ground in potheads mounted on steel rack. Each cable is brought into a non-magnetic spreader

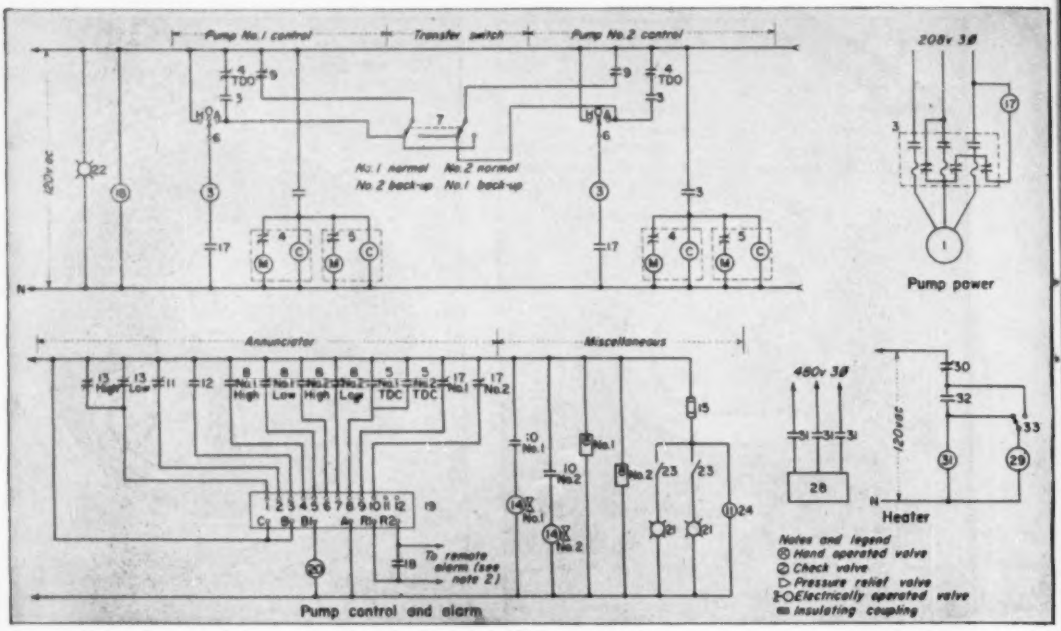


FIG 5—ELECTRICAL CONTROL SYSTEM on oil supply to cable assures supply at all times. Oil pressure is kept at 200 psi average

throughout the high-voltage cable system. This resulted in a somewhat higher factor of safety.

Oil was chosen for the dielectric medium adjacent to the insulation, rather than nitrogen gas. Therefore, to eliminate need for two types of control, oil under pressure was used throughout the pipe-type system. The level terrain also influenced this decision.

The cable installation is composed of five major parts; (1) cable, (2) pipe, (3) terminations, (4) pressure medium and control system, and (5) protection.

The Cable . . . Analysis of the loads and duty cycles resulted in selecting an oil-type compression cable of these characteristics:

Single Conductor: 1,500,000 cir mils triangular segmental.

Insulation: Impregnated paper tapes—650 mils.

Sheath reinforcement—one .005 in. bronze tape, intercalated with a .004 in. polyethylene tape.

Shielding tape—.003 in. perforated copper intercalated with paper tape.

Polyethylene permanent sheath—.065 in.

Two D-shaped brass skid wires, applied double entry.

Main features and thicknesses of the various components making up the single conductor cables are shown in Fig 2. Current carrying capacity of the cable installation for various duty-cycles is:

a. Eight 45-minute full load cycles in an eight-hour period with 20% loading until the next eight-hour operating period, during each 24 hours—977 amp.

b. Four 90 minute full load cycles in an eight-hour period, with 20% loading until the next eight-hour operating period, during each 24 hours—977 amp.

c. 50% daily load factor, as defined by IPCEA—942 amp.

d. 30% daily load factor, as defined by IPCEA—1,089 amp.

Cable with a polyethylene sheath which remains on the cable was selected instead of a cable with a temporary lead sheath which would be stripped off as the cable was pulled into the pipe. Major factors in this decision were ease of installation and less likelihood of moisture contaminating the insulation during the pulling-in process.

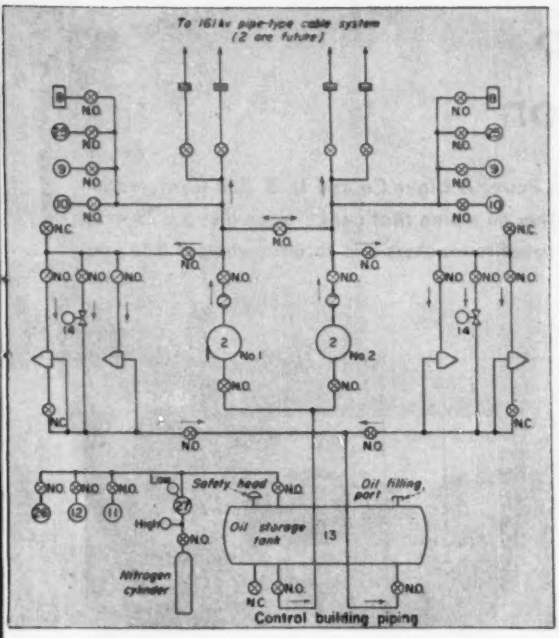
The Pipe . . . The pipe in which the cable was installed is seamless, Grade A steel pipe of 8⅝ in. O.D. with 0.250 in. wall thickness. It was furnished in double random lengths approximately 40 ft each, with suitable flared ends designed for use with chill rings. The pipe system is of welded construction throughout.

Exterior surface of the pipe was sand or shot blasted, primed with Somastic primer, then covered by the extrusion method to provide a continuous and seamless coating of Somastic of ½-in. nominal thickness. The finished external coating was then tested by means of a "Holiday" tester delivering a peak of 30,000 v at low amperage.

The interior surface of the pipe was thoroughly cleaned of all rust, dirt, paint, oils, and mill scale by rotary steel brushes or interior steel grit blasting. Immediately after cleaning, a coating of No. 260 No-Ox-Ide was applied to cover completely the interior of the pipe.

A typical cross section of the pipe with the three single-conductor cables is shown in Fig 3.

Terminations . . . At each terminal, the three single-conductor cables in one pipe are brought above the ground



into a non-magnetic spreader from which each single-conductor cable is carried through non-magnetic tubing to the single-conductor, 161-kv Class, porcelain pothead. A typical termination is shown in Fig 4.

A fabricated steel rack supports the potheads, the spreader, non-magnetic tubing and required oil connections and the valves for isolating various components of the system. Average height of the terminals to the top of the potheads is 20 ft above grade.

Pressure Medium and Control Equipment . . . The pressure medium used in the pipe system after cables have been installed is oil of such properties that it will fulfill the oil demand under all conditions of operation of the system. The oil has a viscosity of 700 sec Saybolt at 40C. It is degasified and free from moisture before it is introduced into the system and has a minimum dielectric strength of 25 kv when tested in 0.1-in. gap at room temperature.

Pressure control equipment is a dual-pump sytsem with one pump operating normally and the second cutting in automatically when needed. An average oil pressure of 200 psi is maintained at all times. Fig 5 shows the electrical control system schematically and a schematic diagram of the piping control system. An oil storage tank of 1,000 gal capacity with a nitrogen gas seal is provided to insure an adequate supply of oil for the system under all operating conditions.

The oil pressure system is constantly supervised by recording pressure gauges, alarms, and annunciators. The control panel is shown in Fig 6. The dual-pump system, control panel, and oil storage tank are housed in a small brick building located near the terminals at the origination of the cable system at the main substation.

Protection . . . The pipe-type cable system is protected by a high-speed, pilot-wire relaying scheme. Bushing-type current transformers were installed at each pothead. These are used in connection with the pilot-wire relaying schemes, in addition to providing current measurement for loading information and for over-lapping differential relaying-zones at the utilization substations.

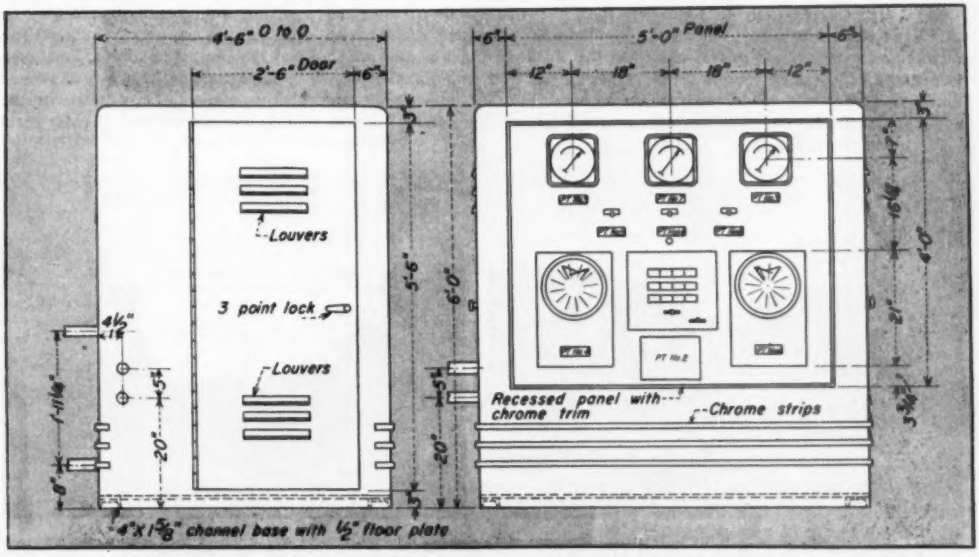


FIG 6—OIL PRESSURE SYSTEM is supervised by oil pressure gauges, alarms and annunciators located on control panel

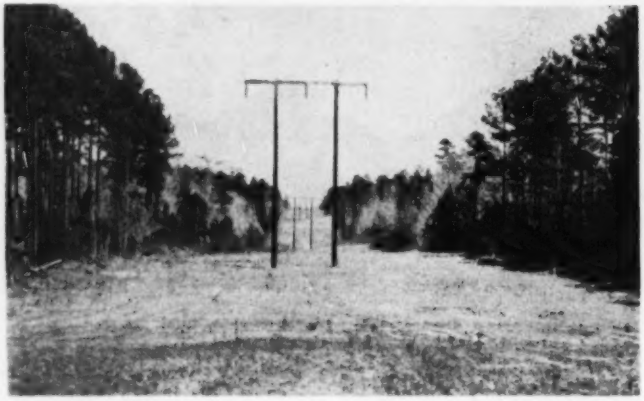
Farm Methods Stop Right-of-Way Erosion

BRUCE F. CHAFFIN, Soil Scientist, Soil Conservation Service, U. S. Conservation Commission, Winnfield, La.

Louisiana Power & Light Co and U. S. Soil Conservation Service get together on a plan that ends erosion along a 23-mile, 110-kv line and benefits ranchers and farmers who own the land

A cooperative project of the Louisiana Power & Light Co and the Dugdemona Soil Conservation District of the Soil Conservation Service for soil erosion control of a 100-ft-wide right-of-way has proved beneficial—not only to the utility but to the land-owning farmers and ranchers as well.

Prior to a reconductoring job on a 56-mile, 110-kv transmission line across parts of Sabine, Natchitoches, and Winn Parishes, the entire right-of-way was bulldozed. This was done to reduce the time-consuming and expensive maintenance job of reclearing lines every 3 years because of the fast growing species of trees in this area. As this section of line traversed one of its hilliest areas, the power company was in trouble because of land erosion.

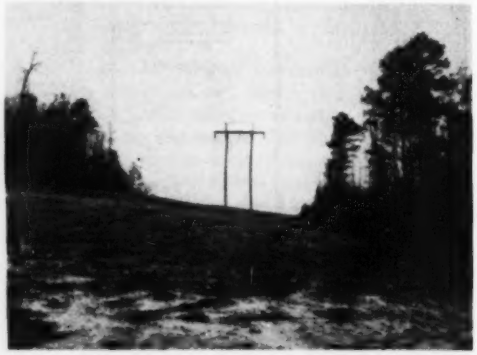


SANDY SLOPE, fertilized and seeded with rye and Singletary peas in early fall, has a good cover of vegetation by February. This is typical treatment for a slope that does not need terracing but which quickly erodes because of sand content unless covered with proper sod

After looking over the right-of-way, the Conservation Service decided that the best approach and the surest way to solve this erosion problem in the Winn Parish section was to follow the same steps that leading farmers of the area were using in solving erosion and land use problems on farm land. A survey was made, and all conditions and factors were studied to determine the kind and intensity of treatment needed to control the erosion.

This work involved determining and locating on a "Plan and Profile" map of the line and right-of-way which types of soil were important in planning treatment and how they were reacting to erosion under present cover conditions. For example, it was found that the more sandy soils with relatively sandy subsoils were gullying more readily than those having a sandy clay or clay subsoil. This was the case under similar conditions of slope and cover. It was also found that the amount of erosion was usually in direct proportion to the degree of

GULLIES in slope were 3 to 4 ft deep before conservation work started. Slope, levelled and terraced, now has a fairly good cover of grass. Sand, light areas, indicates how the soil silts down the slope



STEEP GRADE is covered at top with a good layer of rye grass and peas. Heavy vegetation growth is due to fertilizing and seeding. Bare, sandy areas at bottom are caused by the sand in the soil silting down

Stadium Lighting Installation—Pole base mechanism permits 3-ganged cutouts to be switched from ground.

Combine fuse protection with "disconnect-under-load"

Low-cost G-E oil fuse cutouts give you both

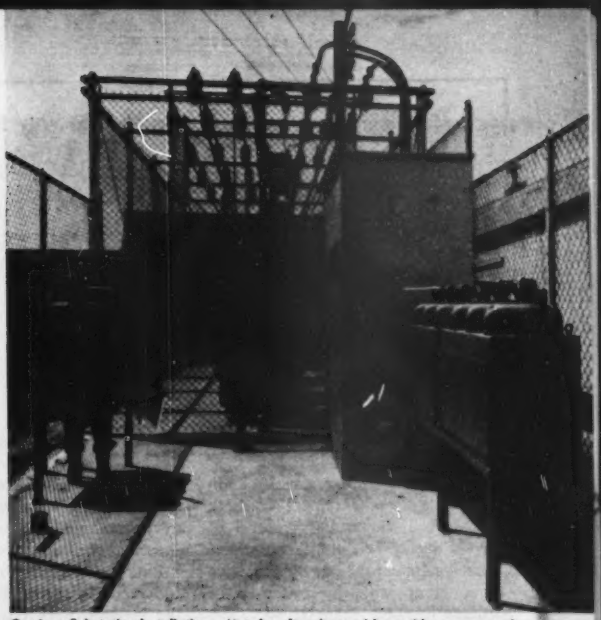
In the G-E oil fuse cutout all arcing occurs under oil when the fuse blows or when switched. The housing, with its drawn steel tank threaded into cast-iron cover, is liberally designed for safety; withstanding internal pressures well in excess of those that can occur at the cutout's interrupting rating. There are no exposed live parts—whether the cutout is in open or closed position—and no expulsion of arc flame.

Special arcing surfaces on the heavy self-aligning contacts keep load-carrying surfaces clean—make it possible to use these cutouts repeatedly as switches to open circuits under loads.

Suitable for both utility and industrial applications, these cutouts are—

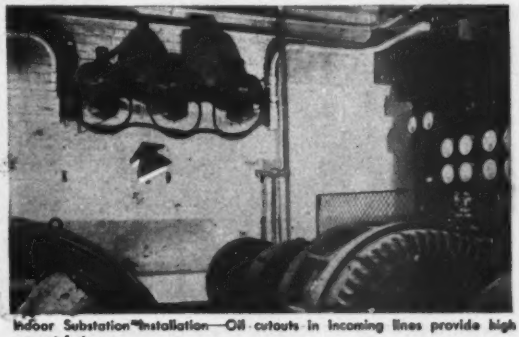
1. **Available for 2400-, 4160-, and 7200-volt circuits, current ratings up to 300 amperes; interrupting ratings up to 11,000 amperes.**
2. **Ideal for indoor mounting, vault or subway mounting and outdoor pole or wall mounting.**
3. **Available in metal enclosed assemblies, single or three-phase, rack or wall mounted, and providing for cable, conduit, or pothead connections.**
4. **Provided with switching mechanisms for single- or three-phase switching and pole base operation on rack-mounted or metal-enclosed units.**

Full information can be found in Bulletin GEA-732—available through your G-E Apparatus Office, or by writing, *General Electric Company, Schenectady 5, New York.*



Outdoor Substation Installation—Metal enclosed assembly avoids exposure of cable entrances and gang-operated mechanism provides for simultaneous switching.

Subway Installation—Expansion chambers attached to cutouts permit complete submersion.



Indoor Substation Installation—Oil cutouts in incoming lines provide high current fusing.

406-40

GENERAL ELECTRIC

Recommended Treatment For Right-of-Way Erosion

Class I—No erosion hazard—No treatment needed	5.8 miles
Class II—Slight erosion hazard—Fertilization to strengthen present cover	1.3 miles
Class III—Moderate erosion hazard—Fertilization and seeding of grass to strengthen and increase cover	13.2 miles
Class IV—Severe erosion hazard—Fertilization, smoothing of gullied areas, diversion terraces and seeding of grasses and legumes	1.1 miles
Class V—Very severe erosion hazard—Heavy fertilization, smoothing of gullied area, diversion terraces, and heavy seeding of grasses and legumes with follow-up treatment	2.3 miles

slope and that present cover conditions were closely related to both types of soil, slope, and removal of topsoil during clearing operations. Cover was made up largely of native carpet grass with a scattering of bermuda in some locations.

In order to determine treatment needs, several broad classes of both slope and cover conditions were set up. These classes, along with the various soil types, were further combined into five broad classes according to their needs for treatment and hazards or susceptibility to future erosion. The sections of the line falling within each of these classes were delineated on the profile map, and treatment was recommended by classes as shown in the table.

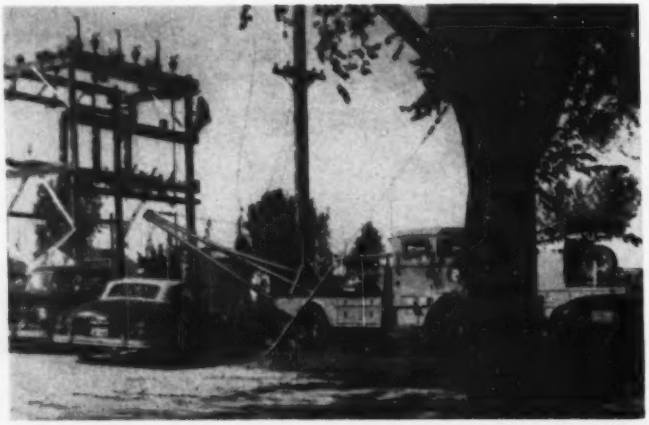
Rates of fertilization and seeding and recommended species of grasses and legumes were given in the plan.

On the basis of these recommendations, smoothing and filling of large gullies, fertilization, and the seeding of rye grass and Singletary peas was begun in September 1950. It was decided to work first on the more critical Class IV and V areas. This work was done by contract. Soil Conservation Service technicians supervised the work and ran diversion terrace lines in those areas where it was considered essential to establish a good grass cover. The tractor and terracing plow owned and operated by the Dugdemona Soil Conservation District built the terraces.

Frequent observation of this work shows that it is standing up well, that erosion is being brought under control, and that the rye grass and Singletary peas are making progress toward covering bare areas of soil. This is being accomplished despite heavy grazing by range cattle and hogs that have concentrated on the only green grazing available for miles around. Fertilization, in this case, is serving a double purpose. It is a well known fact that animals prefer fertilized grass and will travel considerable distance to get it. So, fertilization will not only maintain a vigorous protective cover of grass—one of the best known ways of controlling erosion—but once these grasses are established, the same range animals will in effect be operating as "four legged mowing machines" to the profit of both the individuals who own them and the power company. During the fire season, closely grazed, green-growing grass will serve as a more effective fire break for both woodland and range.

Substation Moved Intact Saves Time and Money

H. G. HALLY, Engineer—Substations, Iowa Power & Light Co, Des Moines



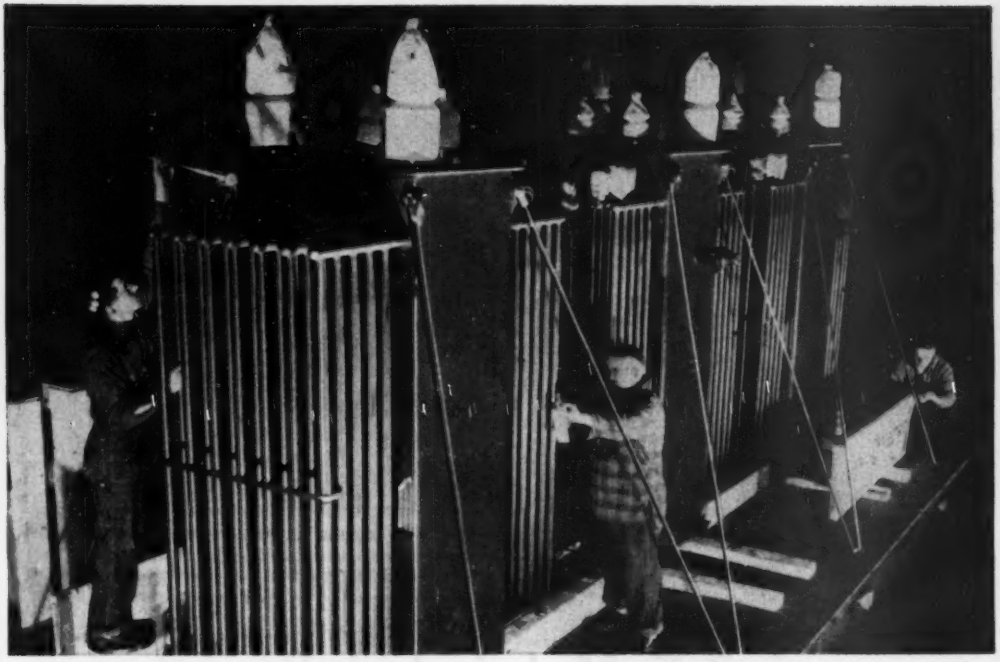
MOVING SUBSTATION INTACT saved 75% of estimated cost of dismantling and rebuilding it at new location 40 ft away. Job was done in eight hours by 10-man crew and two trucks

Moving a temporary wooden substation intact to make room for a new permanent station saved Iowa Power & Light Co 75% of the estimated cost of dismantling and rebuilding it in the new location. The job, from the time the substation was de-energized until it was put back in service, required about 8 hours working time of a 10-man crew.

The four-pole structure mounted 46-kv and 7.5-kv switches, fuses, arresters and bus work. The transformers, regulators, and oil circuit breaker were moved separately.

Temporary bracing was first installed near the ground level of the poles. Poles were then sawed off at the ground level and heavy timbers were placed under them on two sides. Two line trucks, equipped with winch lines, pulled the structure a total distance of 40 ft to the new substation location.

The structure was then leveled on its skids and temporary guying was installed. Time required was only a fraction of what would have been required for dismantling and rebuilding, which meant it could be restored to service more quickly.



89 Different Electric Utilities Specified RM* Transformers in 1951...gain of 15.6% over 1950

RM designs now conform to new ASA Standards... faster shipments, lower prices are retained

Our records for 1951 show that 89 different electric utilities capitalized on the shorter shipments at lower prices obtained by specifying General Electric's RM power transformers. This represents an increase of 15.6% over the 77 utilities that placed RM orders in 1950.

In terms of actual volume, RM units accounted for 59.2% of all orders for power transformers in the RM range—convincing evidence of their wide acceptance, and of the flexibility in application they offer.

This year we anticipate even wider acceptance of RM transformers which now conform to the new Proposed Standards for Transformers, recently adopted by the users and manufacturers represented on the ASA C-57 Committee. These new RM ASA transformers offer the same price and delivery advantages as previous RM designs.

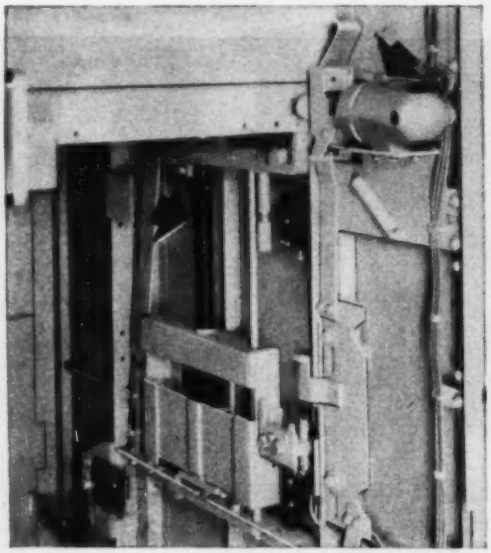
For complete information on the new ASA Standards, and on RM ASA transformers, see your local G-E representative. Or write to *General Electric Company, Schenectady 5, New York.*

*RM stands for "Repetitive Manufacture." By using standardized construction methods, General Electric builds RM power transformers more economically—delivers them faster. RM designs are available in ratings 10,000 kva and below and up to 69 kv, with many optional features.

401-29

GENERAL ELECTRIC

REMOVABLE MAGNE-BLAST CIRCUIT BREAKER features improved flame-retardant insulation and simplified contact design. Breaker operating mechanism and control relay are on the front of breaker for easy accessibility.



NEW FASTER ACTING BREAKER ELEVATING MECHANISM can raise the removable circuit breaker into position, or lower it for testing, in 30 seconds. A new compact gear-motor drives the simplified jack screw elevating mechanism.

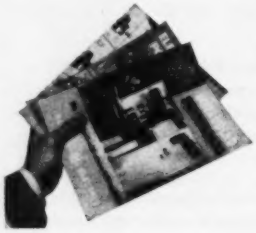
Improved G-E Metal-clad Switchgear

- - - - - - - STRONGER! SAFER! matched to today's demands for more dependable power for increased production

With fast-moving production schedules calling for more and more electric power, General Electric's improved Metal-clad Switchgear, in 4.16 kv and 13.8 kv ratings, answers the need for even greater power circuit protection and freedom from electrical shut-downs.

Retaining all the basic advantages pioneered in earlier G-E Metal-clad Switchgear and meeting all industry standards, this improved equipment offers a wealth of pace-setting design refinements. New features simplify operation and inspection and provide increased safety for personnel. And with stronger, more rigid construction and simplified design of many components, you get even more dependability.

Look over the typical improvements shown here. Then get the complete story from your local G-E Apparatus Sales Office, or write to General Electric Company, Schenectady 5, N. Y.

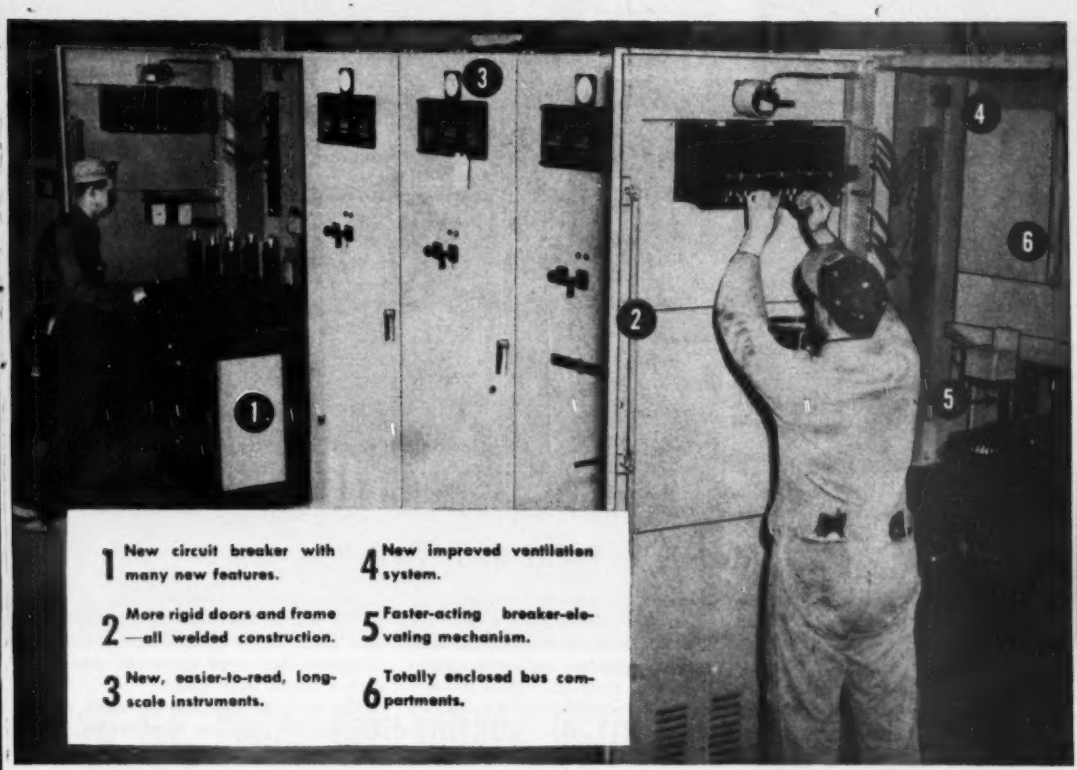


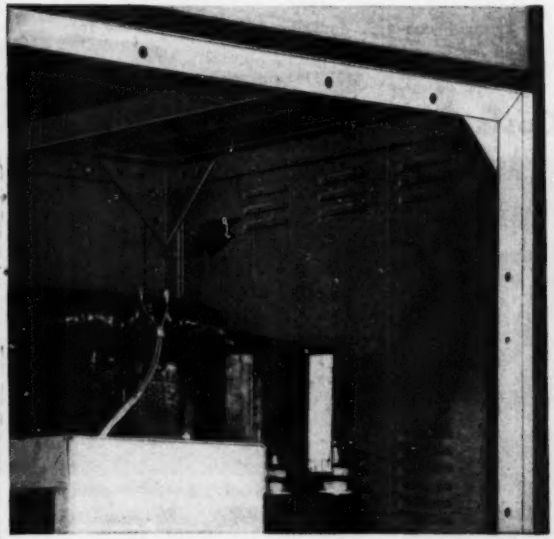
Complete data at your fingertips. Write for these helpful bulletins

Full information on modernizing or expanding your electrical system with G-E packaged equipment is given in these three illustrated booklets. Write for GEA-5664 "G-E Metal-clad Switchgear," GEA-3592 "Load-center Unit Substations," and GEA-5600 "Power for Industry's Third and Biggest Expansion."

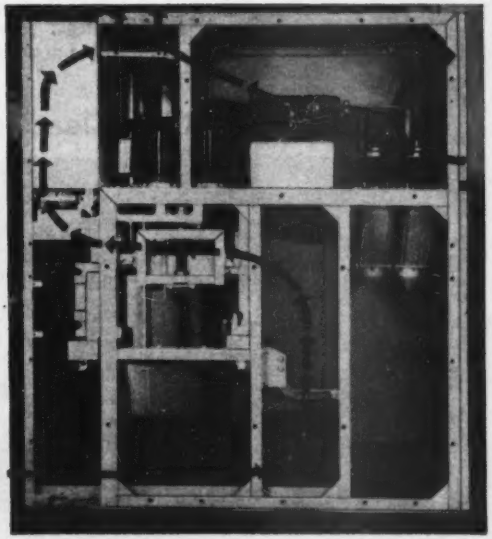
GENERAL ELECTRIC

854-45

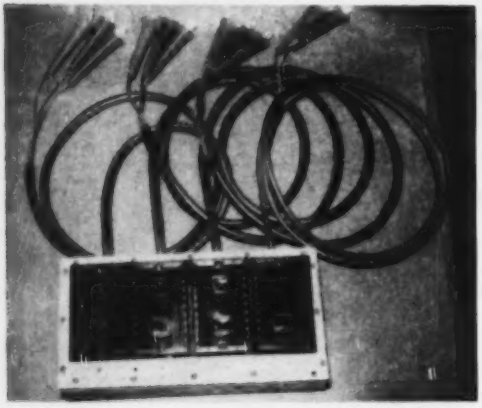

1 New circuit breaker with many new features.
2 More rigid doors and frame —all welded construction.
3 New, easier-to-read, long-scale instruments.
4 New improved ventilation system.
5 Faster-acting breaker-elevating mechanism.
6 Totally enclosed bus compartments.

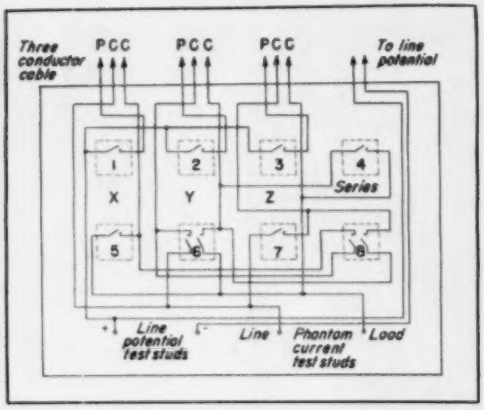


FRAME NOW COMPLETELY WELDED into one solid unit. Gusseted corners (see arrow) provide greater rigidity. Doors have a three-point latch operated from a single handle, and are reinforced against warping by a steel tube at hinge side.



IMPROVED VENTILATING SYSTEM: Arrows show natural draft of air that constantly ventilates entire switchgear unit. The totally enclosed bus compartment, at upper left, is cooled by circulation of air around it.





METER TEST BOX was built of ½-in. plywood to house standard switches and covers and wiring. Leads consist of 600-v, three-wire and two wire cable with test clips and insulators. In field all test instruments are connected to box. Switches allow tests to be made

Check Polyphase Meters in Field with Test Box

Polyphase meter testing on the job is facilitated by a meter test box built by William Bainbridge of Consumers Power Co. The test box connects to the meter side of the test cabinet. All test instruments are connected to the box. Without further changes of temporary connections in the meter test cabinet, the meterman can make all the various tests necessary by throwing the switches mounted on top of the test box.

Test box is used for testing current-transformer-rated meters either on series or single-coil test. It was constructed from ½-in. plywood using standard switches and covers, 600-v three-wire cable and 600-v two-wire cable with standard test clips and insulators.

Test box is used in this manner:

1. Open test block. Make sure current leads to and from meter are free from transformer current. Leave common potential or ground connected to meter.
2. Connect cables from test box to meter side of test block, using red wire for potential, black wire for current to meter, and green wire for current return from meter.
3. Connect test standard and phantom load to respective terminals on test box.
4. Connect two-wire cable to line side of test block for potential.
5. Close potential switches 1, 2, and 3. Indicator in meter will show respective elements.

Bulldozer Blade Cuts Clearing Costs on 110-Kv Line

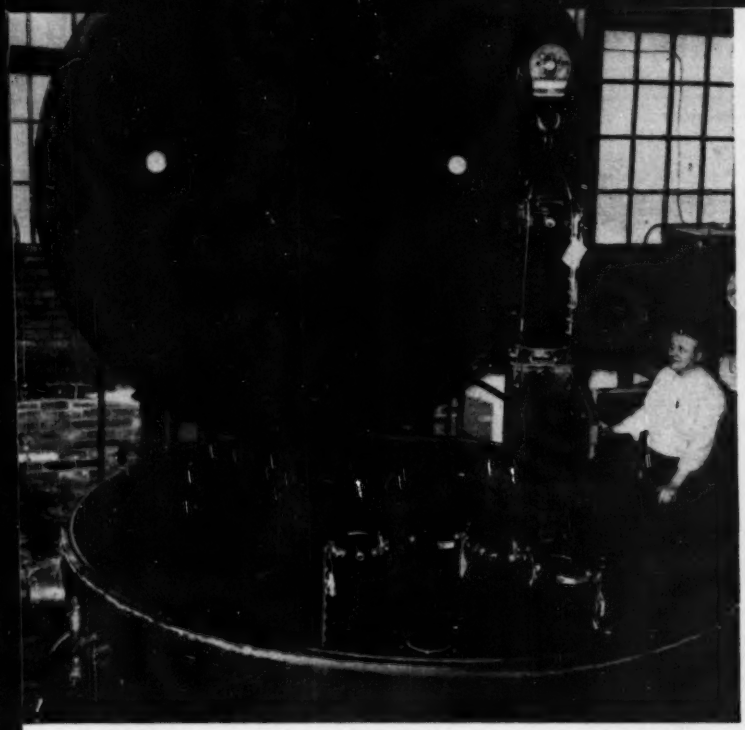
JOE HINDS, Mississippi Power & Light Co, Jackson, Mississippi

TREE CLEARING is done in less time and at lower cost by cat-mounted blade which cuts small trees close to ground in one cut. Larger trees require two or three cuts

A tree-cutting blade of new design for bullodzer mounting saved up to 30% over hand cutting methods in right-of-way clearing for a new 110-kv transmission line from Grenada to Kosciusko, Miss. The line is over 50 miles long.

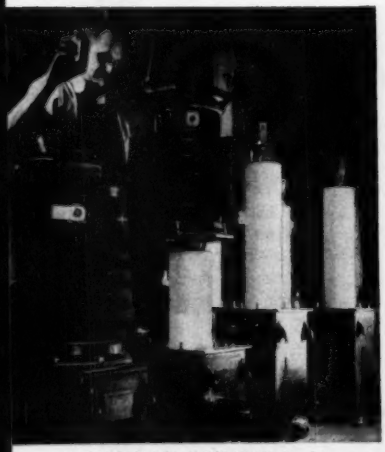
The new blade is especially good in rough or swampy country on small trees and in heavy undergrowth. It can cut down 12 to 14-in. diam trees 6 to 8 in. above the ground. The larger trees require two or three cuts of the bulldozer blade.

Equipment was designed by John Walsh of Walsh & Weaver Construction Co of Jackson, Miss., who were employed as contractors on this transmission line construction job.



TRANSFORMERS ARE PLACED IN VACUUM TANK TO REMOVE MOISTURE FROM WINDINGS

How G.E. Builds High-voltage Instrument Transformers for Dependable Operation



DURING FINAL ASSEMBLY, bushings are fitted on base tanks, maintaining uniform pressure. Long-life nitrile rubber gaskets are the result of years of G-E research.

Built for heavy-duty service, General Electric's Type KG current transformers offer both dependable operation and high, sustained accuracy. Each manufacturing operation, each design detail contributes to sturdy construction and long life.

Core and coils are mounted in a shallow tank and coil leads extend up through a heavy insulating barrier into a porcelain housing which acts as a primary bushing.

HIGH SUSTAINED ACCURACY

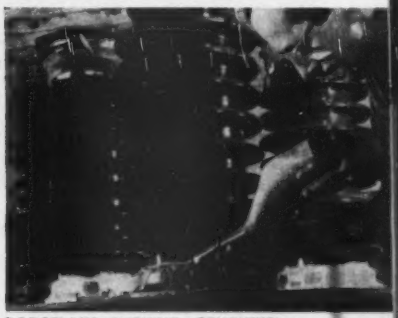
Exclusive features of G-E Spirakore core, for example, assure higher degree of accuracy. Another help: secondary winding is uniformly distributed around core. Transformers are suitable for accurate metering service down to five per cent of the primary current rating and for relay operation up to twenty times full-rated current.

They're available in 25,000- to 69,000-volt ratings. For complete details, see your G-E representative. General Electric, Schenectady 5, New York.

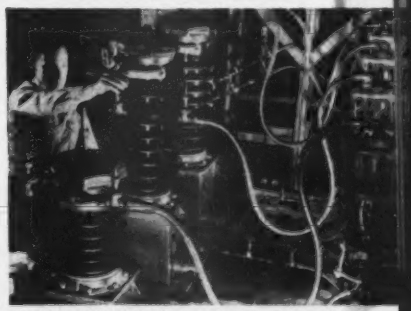
GENERAL ELECTRIC

604-12

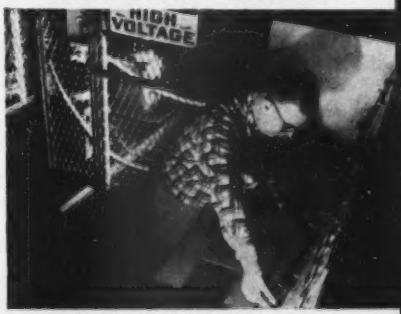
FLEXIBLE LINE TERMINALS are welded to studs. Copper straps connected to studs provide for making series and multiple connections on primary coils without opening transformer.



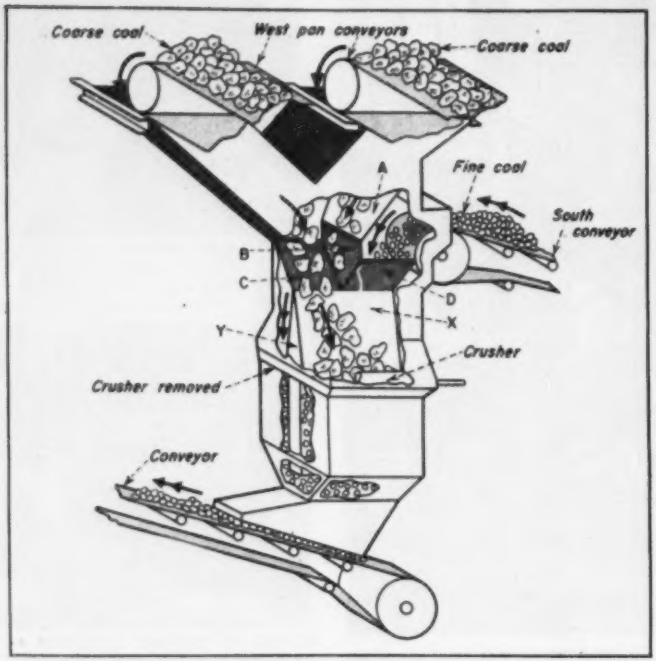
PORCELAIN BUSHING CEMENTED to top and bottom rings. For greatest strength, cement is steam-oven-cured and wet-process porcelain is straight in design rather than tapered.



FILLING STATION slowly injects de-aerated oil while a vacuum is held, impregnating the insulation. Previously, tank was partly filled with sand to keep oil expansion to a minimum.



TO ASSURE HIGH ACCURACY, each completed transformer receives rigid ratio and phase-angle tests which prove that it is well within ASA accuracy-standard classification.



REMOVABLE PARTITIONS A and B and deflectors C and D were added to crusher equipment to eliminate clogging during simultaneous handling of fine and coarse coal. Gates X and Y are held in neutral position. Arrows indicate routes taken by coarse and fine coal

Plates Prevent Clogging in Crusher

L. P. SCALES, Asst Coal Conveyor Foreman, and

R. H. STEEN, Civil Engineer, The Ohio Power Co, Philo, Ohio

Installation of two segregation and two deflecting plates ahead of a coal crusher has facilitated handling two different sizes of coal received from two sets of conveyors.

Serious trouble was experienced due to clogging of the chutes and crushers whenever the crusher house simultaneously received coarse lump coal and fine coal. With no facilities for segregating the coarse and fine coal or by-passing the latter around the east and west crushers, the fine coal crowded the crushers, particularly when 1,000 tons of fine coal per hour was handled simultaneously with sizable quantities of lump coal in coarse sizes.

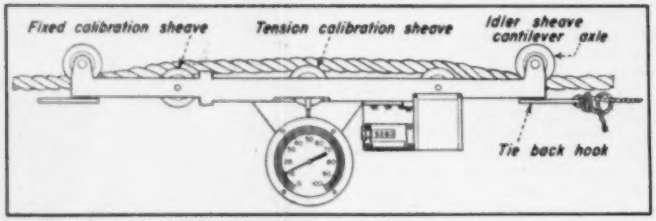
This situation was remedied by installation of four removable segregation and deflecting plates (A,B,C,D) and removal of the east crusher unit (see illustration). The original deflecting gates X and Y are held in their neutral position on the north-south centerline of the chute. Partition A, barrier B, and deflector C route all lump coal from the pan conveyors so that it passes through the west crusher.

Fine coal from south belt-conveyor is routed by deflector D through the passage formerly occupied by the east crusher unit onto the discharge conveyor. This conveyor also receives the pan conveyor coal handled by the west crusher unit. The fine coal does not require first step crushing because it is below 6-in. size.

Measure Cable Tensions Over Wide Range of Sizes

R. C. BLANKENBURG, Underground Engineer, Southern California Edison Co,

By adding an idler sheave at each end of a conventional three-sheave deflection-type tension indicator, Southern California Edison is able to measure with a single calibration tensions on a wide range of rope or cable diameters. This is a convenience with wire rope and indispensible for manila rope because its diameter is greatly influenced by age, condition and tension. With this indicator variations in calibration increase quite uniformly with tension and the full scale variation between a ⅜-in. wire rope and a 1-in. manila rope is within plus or minus 5%.



NEW TYPE TENSION METER works equally well on cables or rope regardless of diameter. Idler sheaves keep the cable lined up on the sheaves on each side of the micrometer sheave, which is cantilever mounted. Cable diameter does not influence the deflection measurements

The meter measures about 3 ft over-all and is designed to measure tensions up to 10,000 lb. In operation it is placed across a slack line, dial down, and held stationary while the line is pulled through under tension. Deflection of the steel cantilever support carrying the center sheave is measured by an indicating micrometer, and converted to tension by a single calibration curve. A footage counter indicates length of travel during pull.

Originally designed to obtain data on actual pulls in the field, the indicator has other possible applications. It can be used to give warning when safe pulling tensions are reached. It can also effectively detect and indicate the result of inadequate provision for controlling pulling tension.

"Call Revere to make sure"

• Revere condenser and heat exchanger tubes and tube heads are available in a number of alloys with a comprehensive range of characteristics which adequately meet the varied requirements of service in power generation and in chemical, industrial and marine applications.

The selection of the proper alloy for a given application requires careful consideration. Many inter-related factors affect the life of a condenser tube, and have an important bearing in determining the alloy which promises the longest possible life and the most satisfactory, trouble-free performance. These important factors should be considered: chemical composition of the cooling water; velocity of the water; possibility of air entrainment; presence or absence of suspended solids; operating temperatures.

To assist the user in selecting the particular alloy which, in his specific installation should give the best service and maximum economy, the Revere Technical Advisory Service is available for consultation on both new equipment and tube replacement. These men, backed by the facilities of our Research Department, can help solve the special problems incidental to each installation. *"Call Revere to make sure."* Write for free booklet, "Life Extension for Condenser Tubes."

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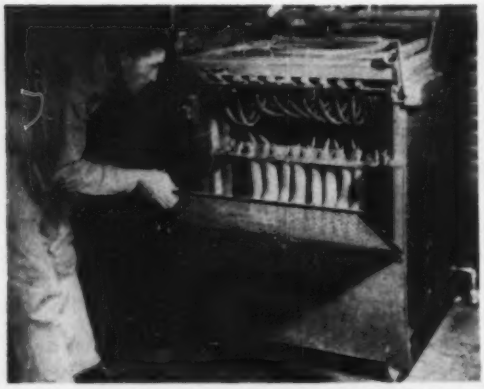
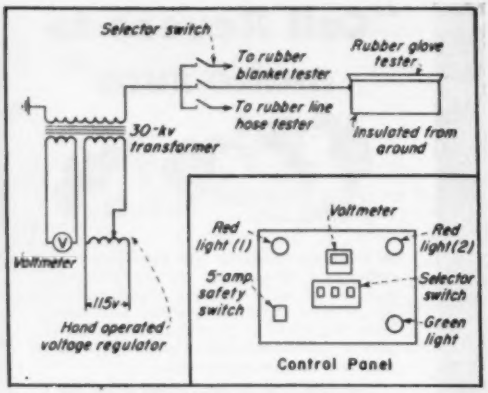


RUBBER GOODS TESTER built in company shop provides potentials up to 33 kv. Top plate is lowered onto rubber blankets placed on machine table for testing. Line hose is checked in casing at upper right. Five pairs of gloves or one blanket can be tested at one time



FAST AND SAFE TESTING is feature of machine represented by this diagram. Selector switch permits operator to test gloves, blankets or line hoses on one machine. Red light (1) on control panel lights when selection is made; red light (2) indicates that circuit is energized

Testing Machine Checks Rubber Goods Four Times Faster

A rubber goods testing machine which cuts testing time from 6 to 1½ hours a week is now in use at Central Arizona Light & Power Co. The machine, which was designed by Andy Coplan, electrician journeyman with the company, will test all rubber goods for potentials up to 33,000 v. Built mainly from scrap at a cost of $750, the tester was made from a 3-kva transformer formerly used for oil testing, a voltage regulator, and base body plates and switches made in company machine and welding shops. Hoses were purchased outside.

Five pairs of rubber gloves can be tested at one time on this machine. They are lowered into the tank on a rack through means of a crank, cable and pulley arrangement. Electrodes are introduced through probes which fit into the gloves, the probe being the ground and the tank itself the hot leg.

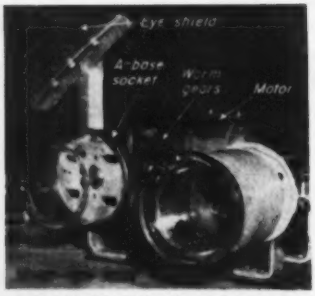
Blankets, which are tested one at a time, are placed on the top of the machine table. An energized plate suspended over the table is lowered onto the blanket. The table itself serves as the ground. Rubber hoses are held in casing in a slot which runs along the top right-hand side of the machine. To test them an energized probe is employed.

In operating the machine, a removable-rod-disconnect switch is placed in position in one of three holes located on the control panel on the machine's upper left-hand side. Two red lights on this panel indicate when all safety factors are closed and when voltage is applied. Because of an interlocking breaker switch on both front and back doors of the machine, both doors must be closed before it will operate. In the event of a short, another breaker switch inside interrupts the circuit. With the exception of the inner glove-testing tank, the entire unit is grounded.

A voltmeter on the control panel gives amount of voltage being applied. Power source is 120 v. Normally 14,000 v is applied at one-minute intervals during testing, although this may vary with the manufacturer's specifications. Induction voltage regulator is located below voltmeter and switches on control panel.

The tester is portable and may be used in the field. It can also test transformers up to 3-kva capacity and 33,000 v, using taps on the back.

Clean Meter Covers In One-Third Less Time



METER COVER CLEANER consists of motor driving cover sockets through gears

Time required for cleaning glass meter covers has been reduced by one-third by a device developed by J. M. Ball, meter shop foreman, Birmingham Electric Co.

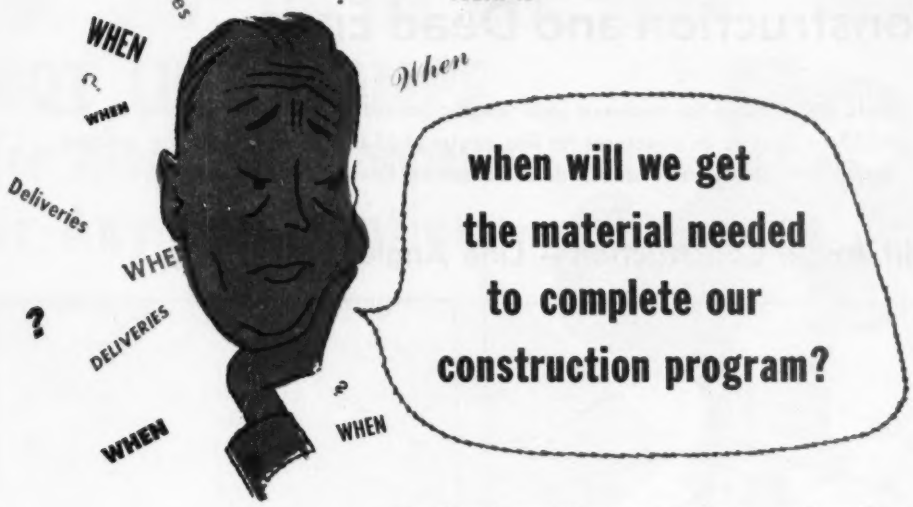
Two glass covers are mounted on the device and rotated at 172.5 rpm. The inside of the covers is wiped clean with a damp cloth and a cleaning compound. The outside cover is cleaned with a razor blade to remove any paint, and then the cleaning compound is applied with a damp cloth. Drying of the meter covers is done with a clean dry cloth.

The device consists of a double-shaft, ¼-hp motor driving stock item worm gears. A saw mandrel is installed on each end for mounting the sockets. One socket is an A-base to hold the meter cover while the outside is being cleaned; the other is a Line Material Co E-400 street-light hood which holds the cover for cleaning the inside. The hood is just the size of the meter cover and its tapered cover makes a perfect fit.

The device was constructed from salvage material resulting in an inexpensive piece of equipment.

No. 2
IN A SERIES

THE PREDOMINANT QUESTION IN THE MINDS OF MANY PURCHASING AND CONSTRUCTION DEPARTMENT EXECUTIVES TODAY IS——



HERE'S OUR ANSWER...

Speaking for ourselves as a manufacturer and supplier of insulators, clamps and fittings, our records show that

BY JANUARY 1952, WE HAD SHIPPED ALL ORDERS PROMISED FOR DELIVERY IN 1951...

a schedule made possible through the use of new, improved and *exclusive* Pinco production techniques and methods.

We are mighty proud of this fine record.

And our customers are mighty happy too.

So if *you* want the best in porcelain, for delivery when you need it—put your problems up to Pinco!

We will welcome the opportunity to prove that Pinco as always, is "RIGHT ON THE JOB."

PINCO INSULATORS

The Porcelain Insulator Corporation ★ LIMA, NEW YORK

Sales Agents:
Joslyn Mfg. & Supply Co.
Offices in
Principal Cities

Span Length Limitations for Split-Angle Construction and Dead Ends

Data are provided for maximum span lengths limited by conductor spacing of three ACSR conductors on structures for line angles of 15-60 deg and 60-90 deg; an adaptation from construction standards of Consumers Power Co.

Split Angle Construction – Line Angles 15-60 deg

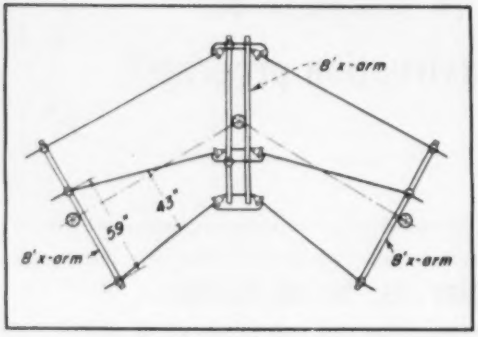


Fig. 1 Average mid-span horizontal spacing = 43 in. Maximum span lengths for conductors on 8-ft crossarm
No. 2 ACSR (7/1), 450 ft
No. 1/0 ACSR, 480 ft

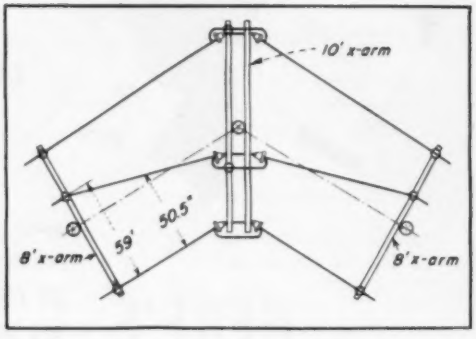


Fig. 2 Average mid-span horizontal spacing = 50.5 in. Maximum span lengths for conductors on crossarms shown
No. 2 ACSR (7/1), 480 ft
No. 1/0 ACSR, 510 ft

Dead End Construction – Line Angles 60-90 deg

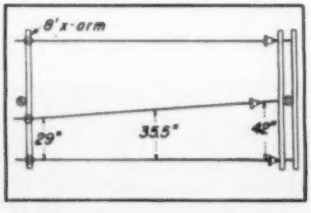


Fig. 3 Average mid-span horizontal spacing = 35.5 in. Maximum span lengths for conductors on 8-ft crossarm
No. 2 ACSR (7/1), 410 ft
No. 1/0 ACSR, 440 ft

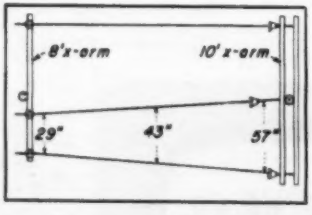


Fig. 4 Average mid-span horizontal spacing = 43 in. Maximum span lengths for conductors on crossarms shown
No. 2 ACSR (7/1), 450 ft
No. 1/0 ACSR, 480 ft

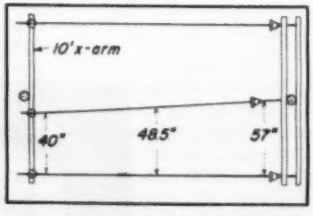


Fig. 5 Average mid-span horizontal spacing = 48.5 in. Maximum span lengths for conductors on 10-ft crossarms
No. 2 ACSR, (7/1), 480 ft
No. 1/0 ACSR, 510 ft

Note: Similar data for tangent and corner structure appeared in Engineering Reference Sheet No. 52-5 Electrical World, March 10, 1952, page 130.

FARGO

HOT LINE CLAMPS for Aluminum, Copper or Any Combination

Built with a Heavy-Duty Spring

to Assure Constant Pressure on the Wire

Fargo "A-G-E Series" Hot Line Clamps are available in 3 sizes—with a heavy-duty spring made of Vanadium steel, stress-relief annealed after plating to insure permanent spring strength.

Mark well the many advantages which this heavy-duty spring provides in Fargo's "A-G-E Series" Hot Line Clamps. To begin with, it makes-up for the variables caused by fault currents . . . atmospheric changes . . . load variations—and the tendency of a conductor to "relax" or "flow" while under stress. Also, it makes the Clamps vibration proof.

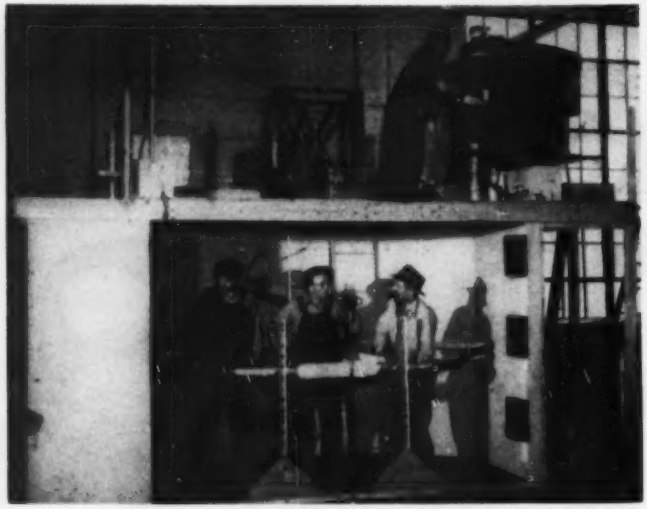
You'll discover, too, the advantage of a new Fargo lock that prevents separation of male and female components —and that the lubricated bolt thread is completely housed to avoid freezing and corrosion. Clamps have a V-jaw which provides 4 points of contact. They are light in weight and can be easily and quickly installed at the end of a stick.

•

Ask your Line Material Field Engineer to give you complete details.

FARGO

LM®



FULL-SCALE MANHOLE was used in Commonwealth Edison Co shops to demonstrate job briefing technique. This procedure can increase efficiency; reduce accidents; and build interest

Job Briefing Promotes Efficiency

A. B. LARSEN, Commonwealth Edison Co, Chicago

Improved performance which comes when an entire crew has a better understanding of the job has prompted the development in the industry of "job briefing" or the "tail board conference." Commonwealth Edison Co, like many others, has applied this technique in carrying on their construction work. The purpose is to: (1) Improve efficiency through better team work; (2) reduce accidents caused by misunderstandings and unforseen hazards; (3) promote better understanding of the job to be done and why it is necessary; (4) increase interest in job by passing on information. In briefing his gang, a foreman should:

1. Explain the job carefully.
2. Explain general work methods or set-up that is to be used.
3. Make definite work assignments.
4. Call attention to existing and potential hazards and suggest ways and means of eliminating and protecting against them.
5. Make sure, through questions, that the men understand what they are expected to do.
6. Issue all instructions clearly and concisely.

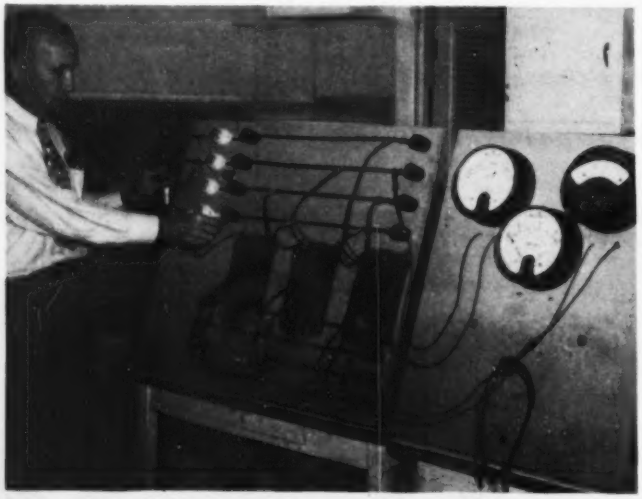
After the gang has been briefed, the foreman is then free to do a real job of supervising.

This "job briefing" demonstration with a manhole for background was given recently by Commonwealth Edison Co in cooperation with the National Safety Council.

Use Hook-Up Board To Teach Transformer Connections

NEILL G. CARPENTER, Industrial Engineer, Gulf States Utilities Co, Lake Charles, La.

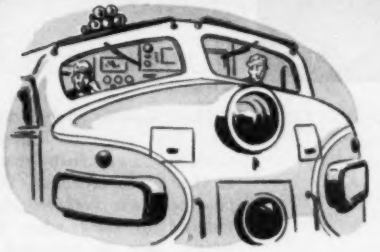
A transformer hook-up board made by a class of utility employees in our local Trade School Utilities Course has proved to be more effective in teaching transformer connections than the use of diagrams or other methods. The board eliminates the handling of heavy equipment and use of high voltages in the classroom. Two similar boards have been very effectively used for a full term at this school.



TRANSFORMER CONNECTIONS are taught very effectively with transformer hook-up board. Two boards are used to demonstrate paralleling transformer banks. Meter panel is at right

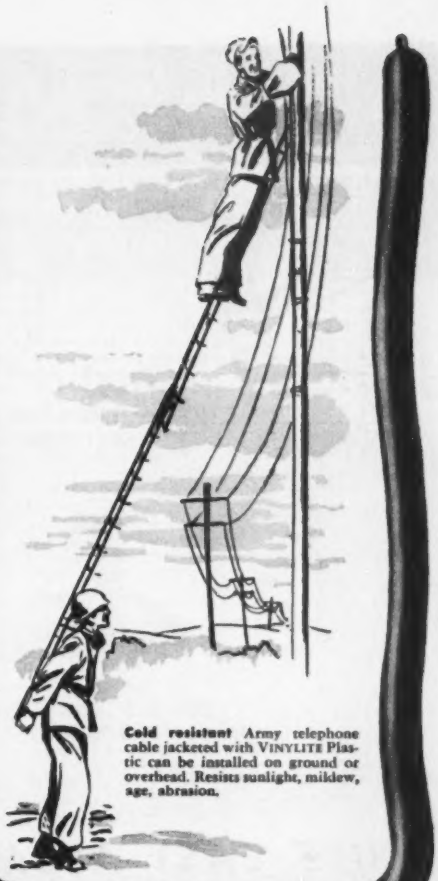
Transformers used as a basis for the board are standard dry type 0.5-kva "booster" transformers rated at 11.5/23-115/230 v, but connected 230-11.5/23 v. As these transformers do not resemble a standard transformer in shape or number of leads, they were mounted behind the board. A standard transformer bank was painted on the front. Polarity can be changed by pulling the leads through the holes in the board and changing their position. The board is made of ¾-in. plywood and is 2½-ft high and 4-ft long. Service knobs are used as bus supports.

Individual switches are furnished for each primary bus, including the one used to simulate the grounded conductor. By using a 120/208-v, 4-wire source, these voltages will be



Heat resistant Railroad signaling cables that are jacketed with VINYLITE Plastics are flame-proof, withstand oils, greases, industrial atmospheres.

Flame resistant. Fire alarm systems wiring jacketed with VINYLITE Plastic is easy to install, resists flame, moisture, oils, greases.



Cold resistant Army telephone cable jacketed with VINYLITE Plastic can be installed on ground or overhead. Resists sunlight, mildew, age, abrasion.

Wire that defies abrasion, heat and cold

Depends on jacketing of VINYLITE Brand Plastics

When things get hot *or cold*—that's the time to count on cable jacketed with VINYLITE Brand Plastics. New materials have been developed to answer the needs of military forces in the Arctic or wherever sub-zero temperatures are encountered. Their wide operating range of from 140° F. to −67° F., together with their toughness and flexibility make them the ideal materials for jacketing cable for commercial uses where low-temperature ducts are involved.

Like all VINYLITE Plastic jacketing compounds, these materials strongly resist water, oils, greases, alkalies, and most strong acids as well as flame, sunlight, aging and mildew. Together with BAKELITE polyethylene insulation, the smaller dimensions save space, their smooth surfaces ease stripping and splicing, speed installation. Lasting colors assure permanent coding.

VINYLITE Plastic compounds have a place in your operation—whether for military or civilian purposes. Write for a list of representative manufacturers supplying them.

MEMO TO WIRE MANUFACTURERS

Write for your free copy of Kabelitems No. 50 which presents the municipal wire and cable specifications which thermoplastic materials must meet. This reprint of the International Municipal Signal Association's report on the various properties of thermoplastic materials gives the requirements which must be met for their incorporation in municipal applications . . . standards met by VINYLITE Brand Plastics. Send for your copy today!

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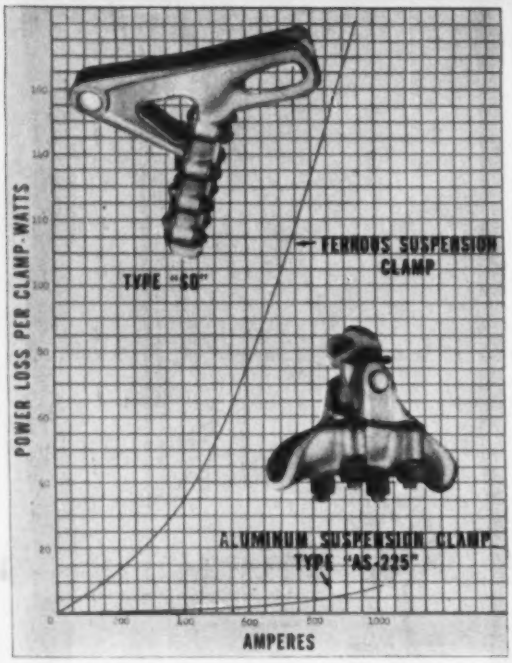

Backed by many years of coordinated electrical, mechanical and metallurgical engineering knowledge and experience in the design and manufacture of cast aluminum products for the electrical industry.

USE CAST ALUMINUM

TYPE "AS" SUSPENSION AND TYPE "SD" STRAIN CLAMPS

ON ALUMINUM TRANSMISSION LINES

STOP—Hysteresis and eddy current power losses.

PREVENT—Corrosion, heating and annealing damage to conductor within clamps.

ELIMINATE—Jumper splice failures—use through conductor strain clamps with continuous jumpers at strain points.

BE SURE—SPECIFY—Cast aluminum clamps with more than 25% greater strength.

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Consult one of our nearest 17 representatives or contact our main office.

OUR PRODUCTS ARE QUALITY CONTROLLED FROM INGOT TO FINISHED PRODUCT

ANDERSON BRASS WORKS, Inc.

POST OFFICE DRAWER 2151

BIRMINGHAM, 1, ALABAMA

available by manipulating the switches:

Phase	Wires	Volts
3	4	120/208
3	3	208
1	2	208
1	2	120
1	3	208, open Y

Fuse sockets fused with 5-amp plug fuses are used to protect the transformers and leads from false or accidental connections. Only one pilot light was available and it was installed to show when the high voltage side is energized. Three lights would be better.

Only two leads for the high-voltage side are brought to the front and are connected to the two 115-v windings which are connected in series. Both ends of both low-voltage windings are brought out and connected to simulate an actual transformer. To simulate the later model transformer having only three terminals on the low voltage side, the two middle wires are clipped together.

Rubber covered flexible radio test lead wire is used for the primary or high voltage leads; black is used for the low voltage leads. Regular radio test clips are used for connecting transformer leads to both primary and secondary buses. Length of the transformer leads is such that when they hang down they do not touch the low voltage bus or short out together.

Additional connections to those shown in table are possible, such as paralleling two transformers for doubling the capacity; paralleling the high sides of two transformers with a series connection on the low sides for doubling the voltage.

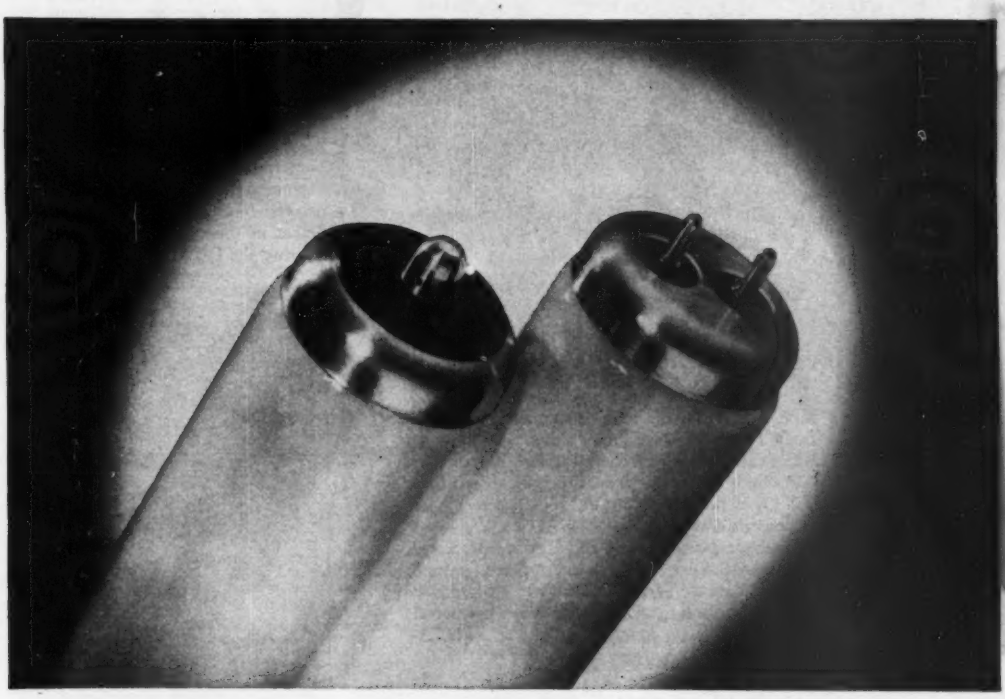
Supply voltage leads are connected to the rear by larger test clips and are used to advantage in problems of "shooting trouble." They are also used to change phase rotation when paralleling banks together. To change a transformer from additive polarity to subtractive polarity, the high voltage red leads are pulled out of the holes, exchanged and pushed back.

Two voltmeters are used to show what happens on both the high and low voltage sides of a transformer bank at the same time. The meters read ten times the actual supply voltage to simulate the 2300-v system normally used. Multipliers are used when simulating connections on a higher voltage system.

A 10-ohm variable resistance is used with fixed range elements as

There is a difference in fluorescent lamps

This is one . . . found in G-E lamps, of course!



THE ends of these fluorescent lamps are aluminum. Rough handling doesn't crack them. Cold can't shrink them enough to make them crack the glass tube. They can be heated hot enough to make a tighter seal. They eliminate one reason why fluorescent lamps sometimes fail before they should. They're on G-E lamps, of course. This is one of many basic differences that make General Electric your customers' best buy in fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

"Cousin Tim's ground line was a disgrace!"

(Cissie Cleanpole's stories of the grim days B.P.)*

"Cousin Tim should be a lesson to us all! Straight and tall and handsome he was, with the jauntiest crossarms on the line. But my dear, his ground line!

"No one noticed for a long time how he was rotting away down there. But it grew worse and worse, until even his friends were talking. Before the end, he had wasted away at the ground line until he was no bigger than a fence post! My mother used to cry when she told of him. It was before the days of PENTA, of course . . ."

*B.P.—*Before PENTA*

PENTA gives clean, positive protection

Cousin Tim's ground line—and his whole length, above and below the ground—would have remained staunch and true if he had been treated with PENTA Preservative.

PENTAchlorophenol, the *clean* chemical formula so easy on the men who climb the poles, guards danger areas like a hawk. And PENTA is not only constant and uniform in its properties—it's powerful!

Poles treated with deep-penetrating PENTA are protected scientifically from the hazards of shell rot, top rot, ground line decay and insect damage. Yet PENTA's *clean* protection for your poles costs no more than other types of wood preservation. For names of companies supplying PENTA-protected poles and crossarms, write:

CHAPMAN CHEMICAL COMPANY
333 N. Michigan Ave., Chicago 1, Ill.
Dermon Building, Memphis 3, Tenn.

CHAPMAN

Penta Preservative

Conforming to A.W.P.A. Specifications P8-49 and P9-49

single-phase and three-phase loads. A 5-amp ammeter is used to measure current. With these, loading of transformers can be demonstrated.

Pole-Mounted Container Holds Cutout Fuses

C. C. DARRAH, Asst District Manager, Appalachian Electric Power Co, Beckley, West Virginia

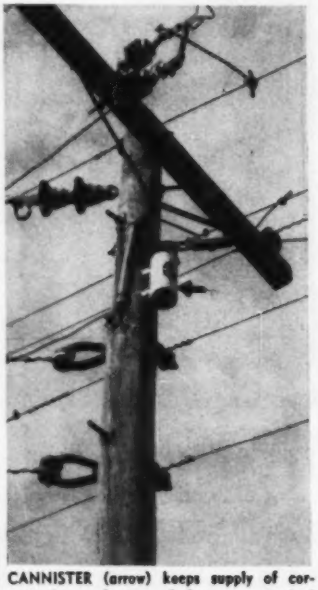
By having a pole-mounted container with cutout fuses these advantages have been gained:

1. Correct fuse link supply is assured at each cutout location. Trouble shooter does not have to know correct size or type before climbing a pole.

2. Convenience for fuse replacement; proper stock is in close proximity to cutouts.

3. Check on fuse blowings during any period can be made easily by counting the links in the container.

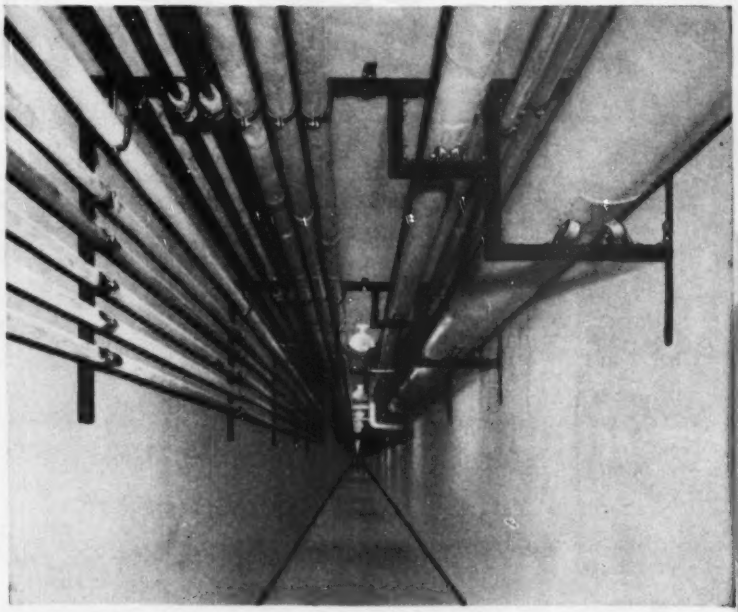
The fuse container is one development of the extended rural program during the last few years. This program has resulted in a complex system of rural lines requiring a rather comprehensive fuse coordination plan. Proper operation of this plan depends on quick availability of the proper size and type of fuses at the right



CANNISTER (arrow) keeps supply of correct size and type of fuses near cutout

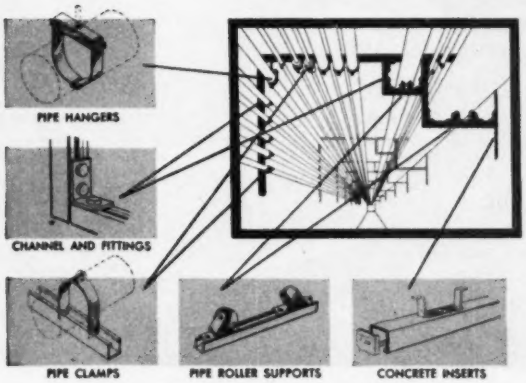
(*Continued on page* 154)

UNISTRUT METAL FRAMING SYSTEM DOES THE ENTIRE JOB* FOR PUBLIC SERVICE COMPANY OF INDIANA, INC.



* Tunnel for all services—electric, steam, water, air and oil lines.

Specifications: Noese & Murphy, Architects—Engineers.
Contractor: Gust K. Newberg Construction Company
Electrical Contractor: Hatfield Electric
Process Piping: Hayes Bros., Inc.



In this large main tunnel installation at Plainfield, Indiana, UNISTRUT channel, concrete inserts, pipe rollers, hangers and clamps support electric, steam, water, air and oil lines—all the services in *one neat package!*

This completely adjustable metal framing system provides a new and more flexible type of mechanical support for every kind of piping, conduit and cable. Assures exact slope or pitch. Permits adjustments, changes or additions to be made at any time. No drilling, no welding, no special tools or equipment. The UNISTRUT method conserves steel, reduces manpower hours, cuts over-all costs.

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For Defense Production—Every day the value of UNISTRUT products is being proved by their use in Defense Industries and Armed Services installations where flexibility, assembly and erection speed count most.

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The World's Most Flexible All-Purpose Metal Framing

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Please send the items checked below, without obligation.
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☐ Wall Chart
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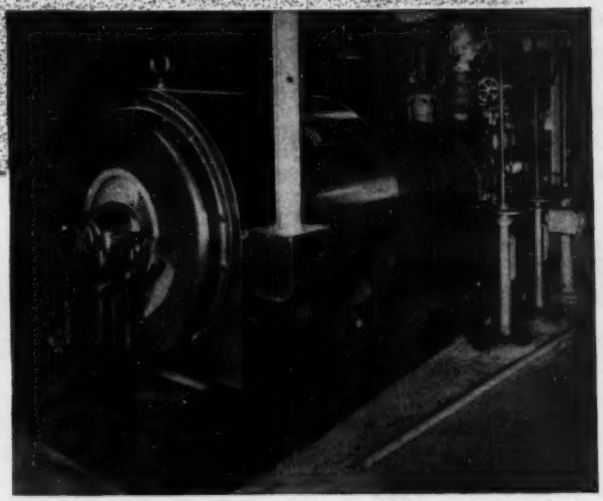
Large ELLIOTT motors do the Big Jobs

Three of six 250-hp, 1200-rpm motors driving pulverizer mills.

Six motors like this drive forced-draft fans. They are 450-hp, 1200-rpm. There are six more motors driving induced-draft fans.

in Central Stations!

AT ILLINOIS POWER COMPANY WOOD RIVER POWER STATION



One of the four 1250-hp, 3600-rpm, drip-proof motors that drive boiler-feed pumps.

In addition to the motors shown, Elliott has supplied motors for driving main boiler auxiliaries for three more units at Illinois Power Company, Wood River Power Station.

Men who know tell us these motors *look* like what they are—smooth, quiet, *competent* performers on important central station drives where rugged reliability is a *must*.

There are good reasons for this. Elliott Fabri-Steel construction brings to big motor design the crack-proof, break-proof stiffness of modern fabricated steel, providing the vitally essential rigid maintenance of air gap.

But that is only part of the story. Fabri-Steel construction for the first time blasts aside the many limitations of old-type construction, enabling Elliott engineers to meet all requirements of motor service, with designs ideally suited to the individual case — and what is almost more important, to effect an easy accessibility that cuts a huge slice from normal maintenance costs.

GET THE FACTS . . .

The bulletins on these two pages are waiting for your request.

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Bermico Fibre Conduit is made from sturdy wood fibre, impregnated with pitch. Its light 8-foot lengths handle easily, quickly. All joints are precision milled for speedy installation. Specially designed couplings won't split. It is water- and acid-resistant, chemically inert. Complete line of bends. Smooth inside bore insures quick pull-through without abrasion. Bermico's quality, uniformity and dependability have made it a standard of the industry for 25 years. For superior cable protection, specify *Bermico* Conduit!

"SAY...THAT'S FOR ME!"

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Pole-Mounted Container

(*Continued from page* 150)

places. Consequently, the Beckley District has found it expedient to utilize fuse-line containers mounted at each primary-fuse location.

Aluminum first-aid kit containers equipped with hangers and snap-swing covers satisfied the requirements. Each container was mounted upside down on the fuse-cutout pole, fairly close to the cutout, and labelled with paint brush or stencil to show the proper fuse for the cutout. Upside-down mounting prevents water from entering the container. Each container is filled with an adequate supply of the proper fuse links.

Deionization Cuts Cost Of Treating Feedwater

Use of a silica-removing deionization system instead of distillation equipment is producing savings of about 17% in the cost of treating feedwater at the Prairie Creek Station operated by Iowa Electric Light and Power Co. The two stage system installed is meeting severe requirements in conditioning raw water which is high in both ionized solids content and hardness. The system is also doing a good job of removing silica and carbon dioxide from the water.

The installation consists of a cation exchange unit 3½ ft in diameter and 10-ft high, an anion unit 4½ ft in diameter and 10-ft high, and a single degasifying tower for removal of carbon dioxide. The cation unit contains a 50-cu ft charge. In the anion unit, a bed contains 47 cu ft of Amberlite that removes not only the silica but also traces of carbon dioxide missed by the aerator. About 2 gal of caustic are needed for regeneration of the anion exchanger for each 1000 gal of water processed. Between regenerations the anion unit is able to condition 120,000 to 130,000 gal of water before significant silica breakthrough occurs.

Each cation unit conditions 21,000 to 23,000 gal between regenerations, and requires about 5.2 lb of regenerating acid for each 1000 gal of water treated.

Results of this installation show the resistance of the water has not fallen below 100,000 ohms, and the pH values lie between 9.0 and 9.8. Seldom is a trace of silica found.

MECHANICALLY OPERATED VALVE Improves Performance

OF DIAMOND MODEL IK LONG RETRACTING SOOT BLOWER

The valve now being used on Diamond Model IK Long Retracting Blowers is actuated mechanically by the carriage that projects and retracts the lance tube . . . as shown by the photographs at the right. Opening and closing of the valve is positive . . . dependable . . . accurate.

Note the simplicity of the mechanism. Ample adjustment is provided to permit valve operation to be set at the proper point for each individual blower. This valve has very low pressure drop and is suitable for either steam or air blowing; it has the exclusive Diamond adjustable pressure control unit for selection of blowing pressure to meet individual blower needs. This mechanically operated valve has been in field operation on many IK Blowers in severe central station service for the past two years. Results have been so satisfactory that it is now standard on IK Blowers.

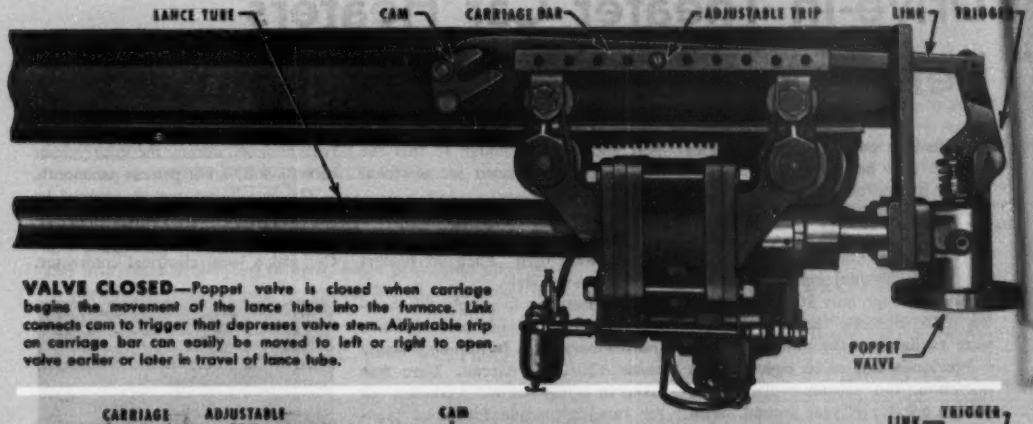
DIAMOND POWER SPECIALTY CORP.

LANCASTER, OHIO

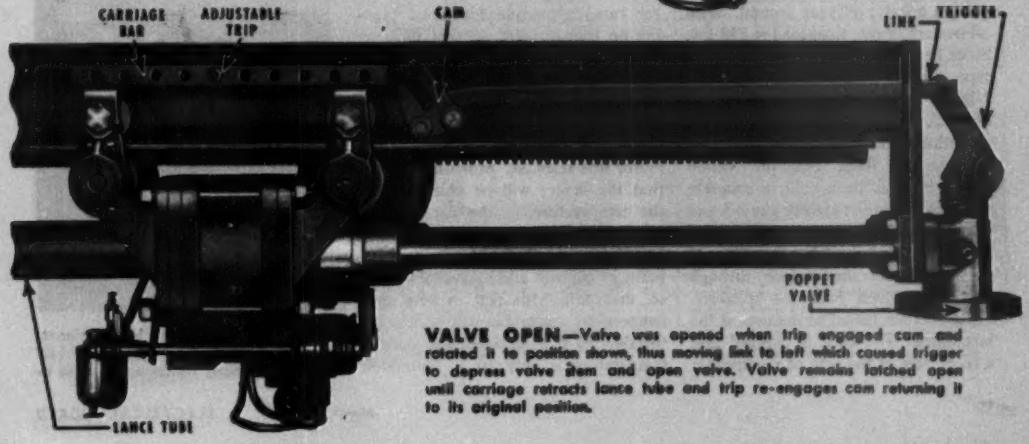
Diamond Specialty Limited • Windsor, Ontario

ADVANTAGES

- Positive valve action
- Simple and rugged mechanical linkage
- Adjustable valve operating position
- No critical adjustment for tight valve seating
- Completely adaptable to steam and air blowing, interchangeably
- Low pressure drop
- Adjustable pressure control on each individual blower



VALVE CLOSED—Poppet valve is closed when carriage begins the movement of the lance tube into the furnace. Link connects cam to trigger that depresses valve stem. Adjustable trip on carriage bar can easily be moved to left or right to open valve earlier or later in travel of lance tube.



VALVE OPEN—Valve was opened when trip engaged cam and rotated it to position shown, thus moving link to left which caused trigger to depress valve stem and open valve. Valve remains latched open until carriage retracts lance tube and trip re-engages cam returning it to its original position.

4642

SERVICE POST has junction box at base for feeder wiring connections and fuse blocks. Examining post is Howard Titus of Dayton utility

DISTRIBUTION BOARD in partially buried concrete vault serves underground feeders to speaker post junction boxes

Drive-In Theater Car Heaters Permit Year Round Operation

Immediate customer acceptance of electric car heaters at a drive-in theater is reported by Max Milbauer, operator of the Belmont Auto Theater, Shakertown Pike, on the outskirts of Dayton, Ohio. On the opening night, Feb. 1, 1952, 600 cars entered the theater although only 300 of the present 626 portable heaters (540-w) were available at the time.

Previously limited to eight months operation, this theater will now be able to operate all year around. With all heaters in use, total load is 338 kw. Since heating load is mostly resistance type, a high power factor is expected. Nightly operation provides desirable off-peak load.

Entire installation is underground. Transformer bank and the switch panels have all been built in concrete vaults which are partially buried and do not interfere with customer's view of screen. Underground wiring is brought up to the surface through the pipes which hold the speakers.

Heaters are issued to the cars at the box office. The cord is plugged into a receptacle at the side of the speaker post and is long enough so that the heater may be placed at any convenient location.

The heaters are supplied at 120 v. Three-wire 120/240-v single phase circuits were used. Each six heaters are fused separately.

The substation to supply this heating load consists of three 100-kva transformers, each furnishing a single phase 120/240-v circuit. Care was taken in laying out ramp connections for cars to provide for equal loading on transformers, so that the cars locating all in one section would not cause excessive loading on one transformer.

After a thorough investigation, a 500-w heater with a 40-w blower motor was selected. Milbauer expects that the heater will be able to raise the temperature in the car 35 deg (7 deg per 100 w) above outside temperature. Body temperature of occupants of car will add to available heat so that Mr. Milbauer expects that temperature inside car will be a comfortable 70 F even when the outside temperature is only 20 F. Estimated requirements during the four winter months is 67 kwhr per car per month.

The installation was engineered by Howard Titus, power sales representative of The Dayton Power and Light Co, and a local electrical contractor.

SUBSTATION in partially buried concrete vault has three 100-kva, single-phase 120/240-v transformers. Heater load is 338-kw

HIGHER PUNCTURE VOLTAGE VALUES WITH

VICTOR PURIFIED PORCELAIN

VICTOR NO. 900
SUSPENSION INSULATOR

Laboratory tests prove VICTOR *PURIFIED* PORCELAIN has 18% higher mechanical impact values, an improvement of 24% in the range of M & E strength values and oil puncture values that are remarkable (See charts at right!)

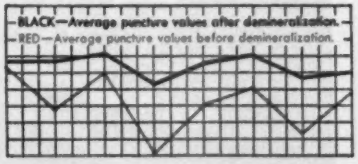
Secret of VICTOR *PURIFIED* PORCELAIN is the removal of mineral salts from water used in processing. Years of research in this field have reduced fluctuations in shrinkage and density and practically eliminated the formation of microscopic, glass-like impurities which, up to now, have prevented attainment of maximum strength and hardness. Result—the finest insulator porcelain ever made!

VICTOR INSULATORS, INC. • VICTOR, N. Y.

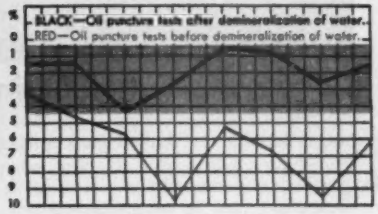
HERE'S PROOF!

Shown below are records of tests made on VICTOR 10" 15,000 lb. Suspension Insulators picked from production runs. These charts show test results of puncture under oil before and after demineralization of water. The first shows average puncture values of tests made and reveals a 7½% increase of average puncture values after water demineralization. The second shows percent average deviation of puncture values.

TEST RUNS OF PUNCTURE UNDER OIL



Average Puncture Values of Tests Run



Percent Average Deviation of Puncture Values

VICTOR
SUSPENSION INSULATORS

Electric Oven Keeps TV Tubes Uniform

Baking TV picture tubes in a 160-kw electric oven at the cathode ray tube plant of the National Union Radio Corp, Hatboro, Pa., provides accurate temperature control and helps maintain uniformity in manufacture. Baking process is put on production line basis as tubes pass thru the 104-ft oven. Special dollies equipped with vacuum pumps remove air from tubes during baking. L. Albertson, Application Engineer, Philadelphia Electric Co.

Conveyors Cut Handling Costs

Materials handling with motor-operated conveyors at Continental Can Co, Mifflin Borough, Pa., keeps human handling to a minimum and effects substantial savings in production. One million cans are moved daily at high speed by conveyors which criss-cross entire plant. Picture shows 5 gal "livestock-spray" cans on motor-operated belt conveyors at end of production line, ready for shipment. K. P. Allen, Industrial Power Engineer, Duquesne Light Co, Pittsburgh, Pa.

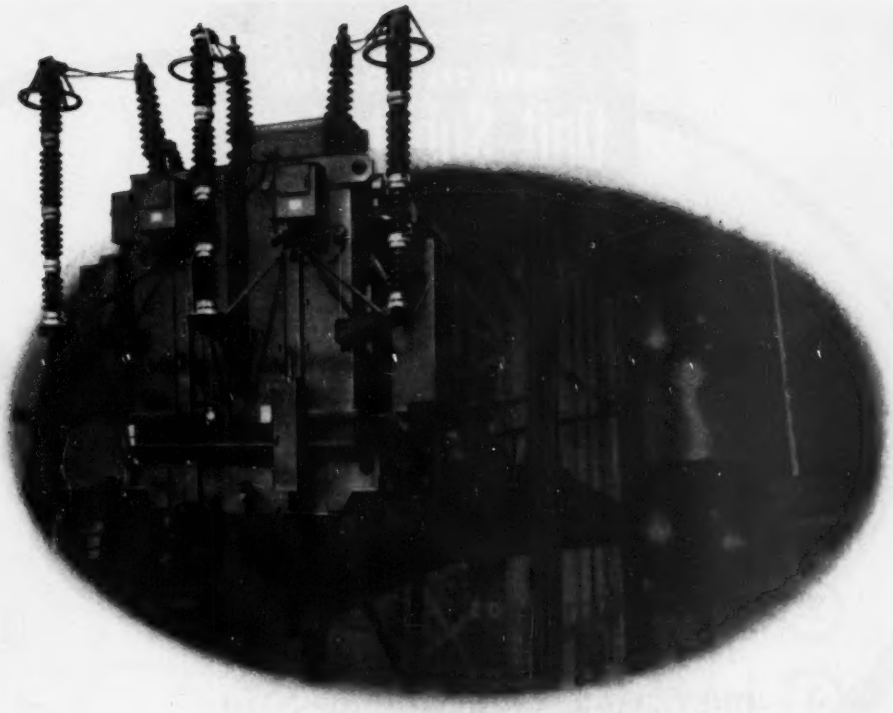
INDUSTRIAL BRIEFS

Space Heating with electrically heated hot water provides mild weather heating system for offices of La Bour Co, Elkhart, Ind., independent of large factory heating system. It eliminated room temperature conflict between office and factory. A 10-kw side arm heater was installed in a 500-gal insulated tank. Thermostat in tank controls half of wattage and other half is on continuously. Circulating pump is controlled by thermostat in office. Howard W. Rosenberger, Commercial & Industrial Dept., Indiana & Michigan Electric Co., Elkhart, Indiana.

Supervisory Control and telemetering at the Pentland Pumping Station of the General Petroleum Corp permits control of six pumps on two 8-in. main crude oil pipelines from dispatcher's office 11 miles away. Each pump has 75-hp explosion-proof motor. Flow of oil also is telemetered. Westinghouse Electric Corp.

Woods Irrigation by spraying waste water from food processing plants over selected areas of woodland at the Seabrook Farms Co, Bridgeton, N. J., and the Francis H. Leggett Co, Landisville, N. J., has solved a difficult disposal problem. Seabrook uses seven 100-hp deep well turbines to pump over one billion gallons of waste water per packing season to rotating spray nozzles. Legget system uses two 50-hp pumps to dispose 25 million gallons during month of August '51. Initial investment is only 10% of biofilter plant and operating costs are comparable. Natural ground water is improved and nearby wells are not polluted. Wm. S. DeHaven, Power Sales Engineer, Atlantic City Electric Co, Pitman, N. J.

Coolant Heating for three automatic saws with 400-w pancake coils of soil heating cable at the Canton, Ohio, Forge & Axle Works of Poor & Co, eliminated freezing and saved $57 monthly operating costs. Formerly it was necessary to replace the coolant during winter with a light-grade oil costing $70.40 per month (160 gal). Heaters cost $8.33 per mo operating a 24-hr day, 30 days per month, and coolant costs $5.07 per month. After one season operation, coils show no deterioration. G. W. Craiglow, Industrial Power Engineer, The Ohio Power Co, Canton, Ohio.



ADDED PROOF of power transformer quality

SELECTIVE SURGE TESTING ON THE PRODUCTION LINE!

Your greatest assurance of reliability is *proof by actual test.* That's why many users specify ASA and NEMA surge tests.

That's why Westinghouse engineers, too, surge test certain power transformers on the production line. In fact, it has been a production line procedure at Westinghouse for many years. Routine daily tests prove quality of design, workmanship and materials. An ever-increasing number of transformers are being quality control tested. Such tests are particularly important on transformers rated above 69 kv.

Surge testing on the line is *that extra step* that assures Westinghouse quality . . . quality that means extra dependability for you.

Your Westinghouse representative will be glad to discuss all the advantages that Westinghouse power transformers offer you. For details on production line surge testing, ask him for a copy of booklet B-5471, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

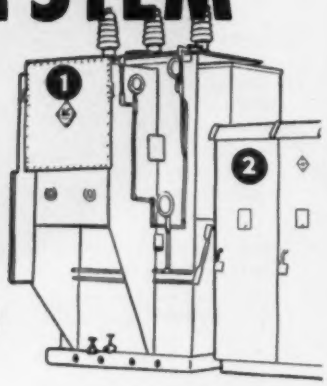
J-70621

YOU CAN BE SURE...IF IT'S
Westinghouse
POWER TRANSFORMERS

MULTI-CIRCUIT

Unit Substations

GROW WITH YOUR DISTRIBUTION SYSTEM



① By Double Ending
② Adding Feeders
③ Increasing Transformer Size

Here's How Allis-Chalmers Substation Design Eases Future System Growth Problems

YOU CAN PREDICT your entire system load at some future date easier than you can predict that of a specific substation. A new housing development, a new industry, a new shopping center—each can make a major change in the load on one substation without greatly affecting the entire system. That's why substation design must be *flexible!*

Easy Field Assembly Speeds Expansion

Allis-Chalmers unit substations not only meet your immediate needs, but are designed to grow with the areas into which they are installed. They are designed for easy addition of feeders . . . easy double ending . . . and easy application of larger capacity transformers.

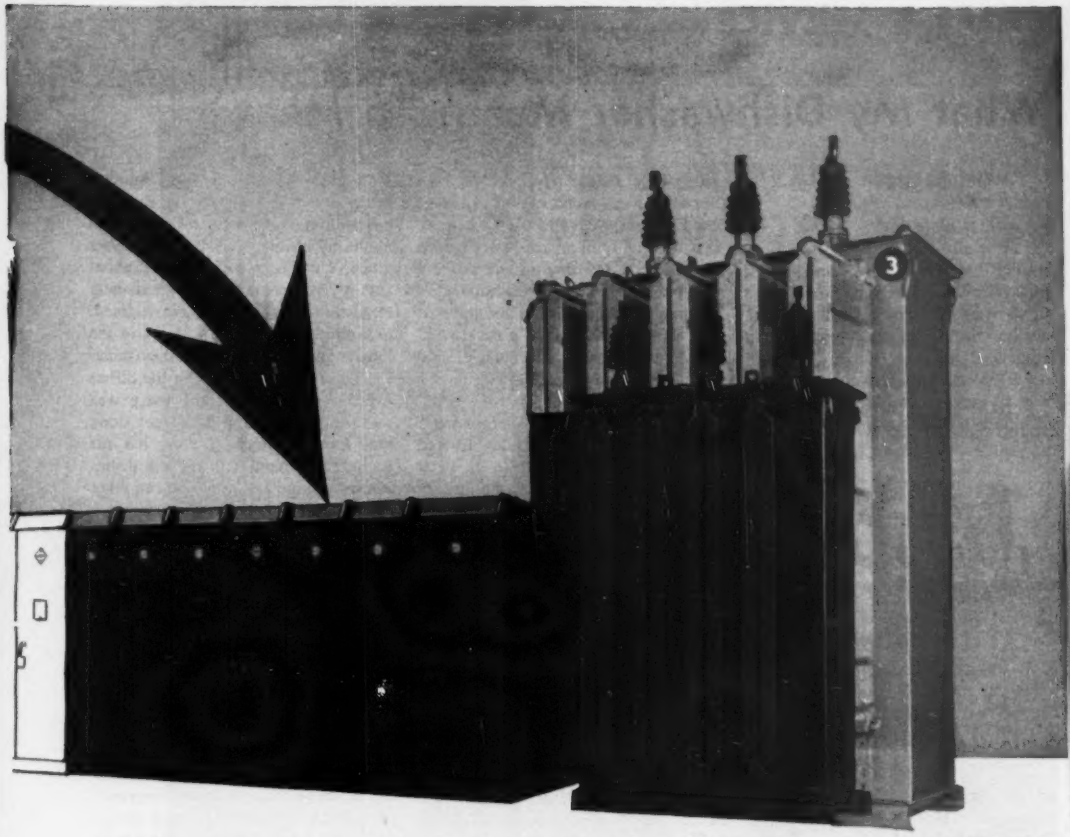
Allis-Chalmers Unit Substations are a convenient answer to the growing distribution problem . . . to the ever increasing demand for power and yet more power. They are simple to specify, neat and modern in appearance, and easy to expand.

You Save These Five Ways

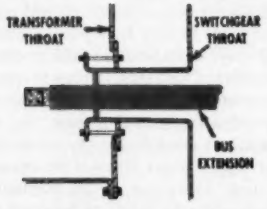
(1) Original equipment cost is low; (2) compact construction reduces space requirements and real estate costs; (3) pre-wired unit design speeds installation; (4) maintenance is quick and economical because of improved accessibility; and (5) you purchase only the equipment you need *now*, deferring additional expenses until load growth demands the expenditure.

For the full story on what Allis-Chalmers Unit Substations can mean in your distribution system, call your nearby A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3385

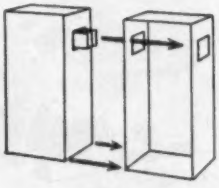
ALLIS-



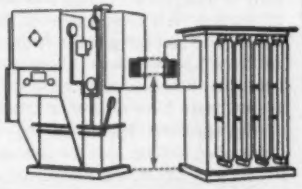
MCS Substations are Expandable These 3 Ways



1 **DOUBLE ENDING** is easy. Throat openings of transformer and switchgear are at exactly the same height. Bus connectors and transformer throat are flexible enough to permit realistic tolerances in concrete base construction. Silver-plated, pre-drilled bus extensions bolt together, are tape covered to speed field assembly.



2 **FEEDER UNITS** are easy to add because they are jig built. Each feeder cubicle is exactly like every other one. Bus extension openings, control wiring openings — even small screw holes — are pre-cut in jigs for perfect alignment. This uniform construction, plus two sides on every cubicle, makes field assembly easy.



3 **A HIGHER CAPACITY TRANSFORMER** — within the limits of breaker size and bus capacity — can easily replace the installed transformer. Standardized throat height on all A-C substation transformers, regardless of rating, permits one transformer to replace another without cutting or reforming the throat or bus.

CHALMERS

A-C ALLIS-CHALMERS

What My Dishwasher Means To Me

MRS. CHARLES R. RIGGLE,
Warren, Ohio

For years I had yearned for a dishwasher. I always hated washing dishes, especially the dinner ones when I was tired after the day's work. But, I always tried to do the job with good grace and not stew too much about it. It always annoyed me because it was an endless, thankless, messy job. One could send the laundry out or

let the dust gather and the beds go unmade if necessary. But those dishes! They had to be washed, come what may. There was no out—until the day of the automatic dishwasher.

One day my husband came home from work and told me that his company (a utility) was offering a wonderful bargain on a combination of dishwasher and garbage grinder. Although we weren't very affluent at the time, I felt that it was such an opportunity as one might have once in a lifetime. A big argument against buying the dishwasher was the fact that we were living in a house we weren't at all satisfied with, and contemplated a move whenever it seemed opportune. However, being a woman who just loves a bargain—what woman does not?—I persuaded my husband that we really ought to take advantage of this one, even tho we would have to store the dishwasher in the garage for the time being.

Then I got the bright idea that what we really ought to do was to build a house, inasmuch as it would be a real pity to just let the dishwasher sit in the garage indefinitely. So we hied ourselves to an architect and had some beautiful plans drawn, with a kitchen that was the fulfillment of my dreams. It was a lovely dream, indeed, but when we saw the cost estimates we changed our minds. So we did the next best thing. We bought a good but old house, completely renovated it, and installed a modern kitchen with the dishwasher.

Then came the happy day when I no longer had to wash dishes. Instead of spending a half hour to an hour standing at the sink, I had the kitchen all ship-shape in a matter of minutes.

A real change began to take place in my life. I found that I had time to do things I never had time for before. No longer did I sneeze and sniffle because of having my hands in warm, sudsy water while doing dishes, so I was feeling better.

Other factors developed. On weekends I found myself cooking really good meals for the first time in my married life. I had always resented spending so much of Sunday in the kitchen washing dishes while the rest of the family lolled around and really had a day of rest. No longer having a

pile of dirty dishes to look forward to, I found I didn't mind preparing the food.

I began doing more entertaining. When I throw a "company" dinner there is usually the matter of washing my "best" china before, as well as after, the meal, because dust does accumulate on stored dishes. This is a matter of little consequence when the dishwasher is on the job. Another thing about entertaining is that my guests do not now have to feel concern about my having to do all those dishes alone. Ours is a maidless household and my friends used to offer to help clean things up, but I always declined, of course. I didn't like to work in the kitchen in my best party clothes, much less let my friends do it. So the dishes just sat waiting until the party was over and frequently didn't get done until the next morning. Now, it's just a matter of minutes to put the dishes in the machine and everyone can relax and enjoy themselves.

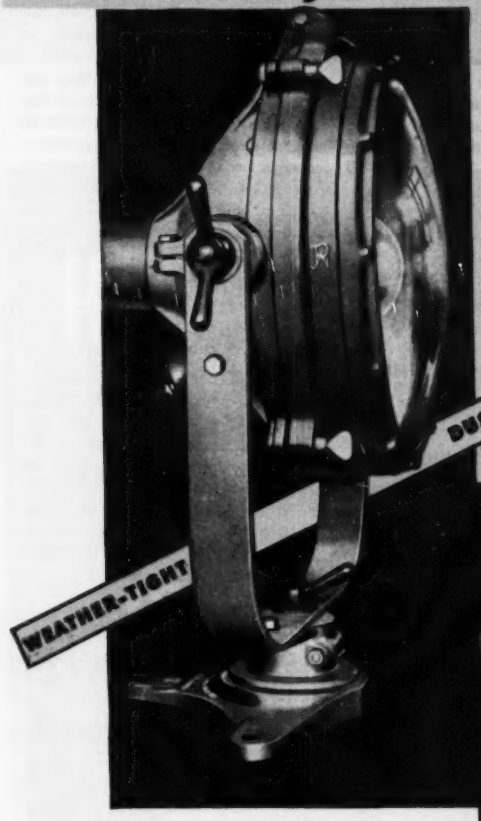
For those who feel the family might lose "something" by not gathering around ye olde family dishpan, let me tell you that the added time for doing things the folks really enjoy pays a lot bigger dividends in family fellowship than ever came out of a dishpan.

No more arguments between the children as to whose night it is to wash or to dry. The children still have an opportunity to help as the dishes do have to be removed from the table and put in the washer. Another improvement in family relations comes out of the fact that the family no longer feels ashamed when they let Mom do the dishes when everyone has had a hard day.

As a mother of three children, it has always been a matter of real concern to me to keep from passing colds, and other contagious diseases to other members of the family. I used to spend hours boiling dishes and keeping them separated from the others to be washed. A great disadvantage was the fact that in many illnesses the disease is most contagious in its beginning stages—thus the infection is passed on before one could start sterilizing. With the electric dishwasher, the dishes are always sterile. I believe that the dishwasher has materially reduced the number of colds in our house.

It is my conviction that an electric dishwasher is the biggest labor saver any home can have. I would give up any other electrical appliance in my home before I would part with it. And I've yet to hear of any other user who doesn't feel the same way.

Consider the years ahead!



For PROTECTIVE and PRODUCTIVE lighting

Specify

PYLE-NATIONAL

ENCLOSED FLOODLIGHTS

Oil Refinery, Oklahoma, 1925

Don't economize on the initial cost when planning a floodlight installation. It is the elimination of large maintenance, repair and replacement expense that counts.

Sealed against moisture and dirt, constructed throughout of rugged, corrosion-proof materials, Pyle-National floodlights retain their original high-efficiency output throughout an exceptionally long service life, with negligible maintenance and replacement expense.

The earliest Pyle-National floodlighting installations are still operating in excellent condition, with *over a quarter of a century* of efficient, economical service to their credit! Convincing proof of the value of quality, enclosed floodlights.

Write for catalog 2100, which gives a complete description of our extensive line of heavy duty floodlights.

The services of our experienced floodlighting specialists are available at all times to advise and assist in installation problems.

THE PYLE-NATIONAL COMPANY

1388 NORTH KOSTNER AVENUE, CHICAGO 51, ILLINOIS

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Export Department: International Railways Supply Co., 30 Church St., New York.

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CONDUIT FITTINGS • PLUGS AND RECEPTACLES • TURBO-GENERATORS • GYRALITES • MULTI-VENT AIR DISTRIBUTION

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power

QUICKLY Installed

TOUGH For long life

● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.

Manufacturer of "THE ANCHOR OF MERIT"

FAIRFIELD, IOWA

School Lighting Clinic Attracts Interest

About 300 representatives of schools and the lighting industry and others interested in school lighting attended a school lighting clinic sponsored recently by the Chicago Lighting Institute. The clinic was held in the Lighting Institute's auditorium where excellent facilities are available for such an activity. Those attending the clinic came chiefly from Chicago and suburban communities but five states other than Illinois were represented. There was also a wide variety of interests represented—architects, 18; eye specialists, 16; lighting equipment manufacturers & contractors, 92; public utility companies, 46; school representatives, 84; general, 8.

Planning Guide For Electrical Homes

Integration of electrical equipment into the plan for the modern home is greatly facilitated by a new 20-page booklet on planning electrical living homes, now available from the Westinghouse Electric Corp. The kitchen and laundry, which probably utilize more electrical equipment than other rooms in the modern home, are considered separately, while over-all considerations include information on lighting, heating, and wiring.

How to select, group, combine, and fit equipment for the modern kitchen and laundry are discussed, employing several photographs and diagrams of possible installations. The booklet is of greatest use to architects and builders, but it is expected that all those who are involved in home building will find it a helpful guide in selecting electrical equipment.

New Attic Fan

A compact attic fan that is stated to reduce the cost of installation is announced by Robbins & Myers, Inc, Memphis 2, Tenn. It is a vertical discharge unit measuring around 3 ft square and projecting only 17½-in. above the attic floor. In new construction, this fan can be installed in less than an hour. All that is needed

(*Continued on page* 169)

Appliance Show Pulls 'Em In

"Record-breaking" was the term applied to the recent 14th Annual Electrical & Home Appliance Show, sponsored by the Bureau of Home Appliances of San Diego County, Calif. During the six days the show was in progress, a total of 185,000 visitors saw the exhibits and displays contributed by manufacturers and dealers of electrical appliances. On one day alone 50,000 people attended the exhibition. Holding attention of the crowd is show hostess, Florence Chadwick, first woman to swim the English channel from England to France.

HI-TENSION NEWS *Junior*

How Important is Tolerance in a Lightning Arrester

To listed average lightning arrester ratings must be added manufacturing tolerance in order to evaluate arrester performance. How important is this tolerance?

Bear in mind that tolerance in a lightning arrester can come from only one place--the Protective Margin. Every per cent of tolerance *added to* catalog averages is *deducted from* the protection afforded apparatus. There are times when you have little protection to waste.

O-B Thorex lightning arresters have the exceptionally low tolerances of +10 per cent sparkover and +5 per cent IR discharge voltages. These close tolerances in combination with low average values leave a substantial Protective Margin available for working use. Protection is what you buy in a lightning arrester, and Thorex tolerances combined with low average values make more of this available.

Leaving out all other Thorex advantages, for the above reasons alone, you should investigate this radically improved arrester.

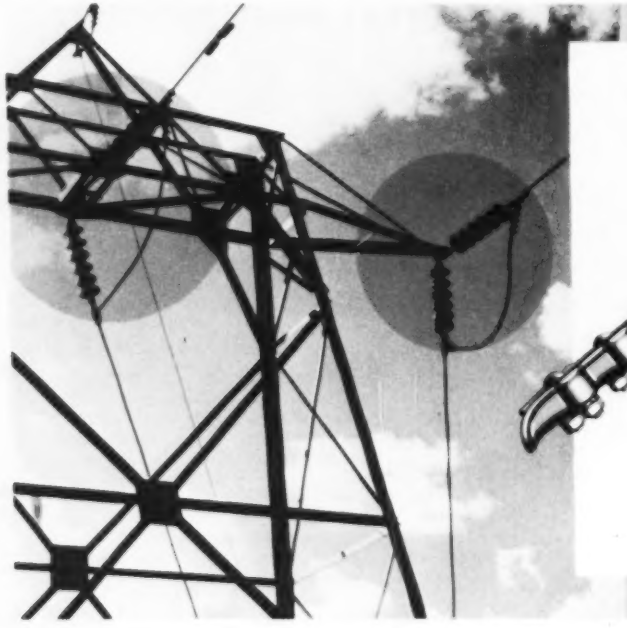
Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

Helping Build a Civic Asset

Encircling one of our large Midwest cities, this high voltage distribution "ring" has not only supplied ample power to local industry, but has been credited with developing the city through attracting additional commercial enterprise. . . . As many as 256 suspension insulator units are on each structure. These insulators, supplied by O-B, are now nearly 30 years old. The very nature of the service places the insulation in a high contamination area. Yet the performance of these insulators has helped to make a record of reliability that has made this "ring" justly famous, and has turned it into a valuable civic asset. . . . Owners of this system have expressed their estimation of O-B insulation in the most concrete way -- by year-in, year-out continued use. This may be one of many sound reasons for making O-B *your* CHOICE OF INSULATORS.



No More Spliced Jumpers

New 22-kv Post Equipped with Clamptop

● With the introduction of the new 8¾-inch O-B Clamptop line post, you can now use the popular post type insulator, plus the modern improvement of the Clamptop head, on all classes of construction from 22 to 69 kv. . . . This new size O-B post is the first combination of the pillar-shaped insulator and Clamptop head made available for 22-kv construction. . . . The modern Clamptop eliminates all tie wires and, with them, the insecure grip and troublesome serve typical of hand ties. Hot line work with the Clamptop is easy and fast, and is done at no sacrifice of conductor-holding power. Loose ends of energized tie wires, once a hazard to hot crews, are eliminated. . . . Add the handiest and best tie attachment to one of the most popular post sizes and you have the new O-B Clamptop line post. Include these in your construction standards.

● How can a strain clamp improve the conductivity of a transmission line?--by eliminating high resistance jumper splices at deadend points. . . . O-B Hi-Lite clamps permit stringing conductors straight through strain points without cutting, thus forming jumper loops with continuous cable. They install in only a minute or two and require no more field equipment than a common hand wrench. No special training of linemen is needed, and no more than common-sense care is necessary to get an attachment that will develop the full working strength of the conductor without slip. At any time, clamping power is easily and positively inspected. . . . In addition to a real saving in construction cost, O-B Hi-Lite strain clamps make possible continuous jumper loop construction with all of its operating advantages. Specify these clamps in your new plans.

Black and White Facts on Performance

You can be sure of a lot of things about a station insulator when it is new--dimensions, strength, and dielectric qualities; all of which are covered by standards. But the one thing you want the most--durability--never reveals itself until the *last day* of the insulator's life. Then, you can count up years of service, and only then! . . . Most station insulators are very much alike on the *first day*, but it's a different story as the years roll by. . . . This fact is significant--most requirements for O-B station insulators come from present users. These companies have their own records where the facts are in black and white, and these records prove that, for what you want the most, and can't specify --performance--turn to O-B.

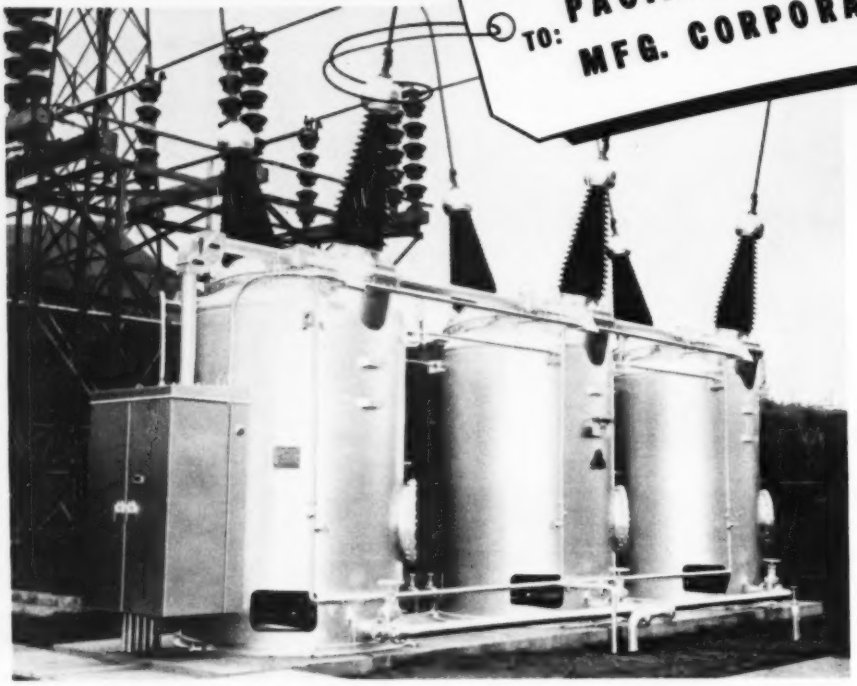
Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

OHIO BRASS COMPANY

TO: PACIFIC ELECTRIC MFG. CORPORATION



● One of several three-phase oil circuit breakers supplied to a large Western system by the Pacific Electric Mfg. Corporation. According to the apparatus builder . . . "These breakers are designed for operation on 230-kv lines, have an interrupting capacity of 7,500,000 kva, and carry 1200 amperes continuously. Interrupting time is 3 cycles, closing time 10 cycles, and reclosing time is adjustable as desired from 15 to 45 cycles. Sliding-shoe contacts require no critical adjustment to fix closed position, nor is contact pressure affected by contact wear. Other Pacific Electric features include closing by stored energy of motor-compressed springs, improved arc extinguishment." And . . .

BUSHINGS

one of the finest components of any circuit breaker-

Ohio Brass

MANSFIELD, OHIO, U.S.A.

4218-HR

is a ceiling opening and adequate exhaust areas. Fan unit rests on the attic floor on a heavy rubber base providing an air seal and cushion and requiring no screws or bolts to hold it in place. Another feature is an improved ceiling shutter, which opens and closes automatically as the fan is turned on or off. This new fan is available in 4750 and 6800 CFM capacities, with air delivery ratings certified.

Appliance Wins Prize

Fresh'nd-Aire, a division of Cory Corp, Chicago, Ill., has been awarded a grand prize in the home appliance division of the 1952 Hess Brothers Award Competition for Versatility in Design and Use. The company was honored for Wall-Aire, a product which is four appliances in one. The compact unit can be used as a cooling fan, a heater, a hair dryer, or a clothes dryer.

How to Iron a Shirt

General Electric, in cooperation with the Manhattan Shirt Co, has prepared an illustrated booklet on how best to wash and iron a man's shirt. Twenty-four pages long, the two-color booklet was compiled by home economists of the G-E Consumers Institute. The booklet traces the course of a shirt from initial preparations for washing through to ironing and folding. The complete ironing-folding operation is broken down into 18 distinct steps, each illustrated by a photograph. The booklet is currently being made available to distributors and dealers of GE housewares.

NOW...RCA MICROWAVE PROVEN BY 3-YEAR WESTERN-UNION TEST ON 1000-MILE SYSTEM.

Can Microwave Help You?

Read Answer Below

Since 1948 RCA microwave has been flashing Western Union telegrams from Pittsburgh all the way to Washington, Philadelphia and New York. After more than three years of continuous service, the record for reliability is almost perfect . . . *far better than corresponding experience with land lines.* Western Union has purchased sites for towers so that it can extend microwave to many other areas . . . proof enough of its outstanding performance.

Microwave is "Weather-Proof"

Signals in RCA microwave system travel on radio beam from one parabolic antenna to another. Eliminates outages due to sleet storms because *ice can't form on a radio beam.* Chain of relay towers spaced 25 to 50 miles apart relay signals over mountains and valleys, operate normally unattended. Eliminates pole lines, easements, line maintenance. *Costs less per mile than any other type of system of comparable capacity.*

Can Your Business use Microwave?

If you need *reliable* communications that can span long distances through all kinds of terrain and weather, RCA microwave is the modern money-saving answer. Let RCA engineers survey your situation. Microwave is quick and easy to install. Installation and service is available from the RCA Service Company.

Microwave offers plenty of Capacity

System offers channels for voice, supervisory controls, teleprinter, facsimile, 2-way radio and other circuits. Plenty for all your needs.

Leading Companies use Microwave

Proof of RCA microwave acceptance by industry: users include Pennsylvania Turnpike Commission, Central Arizona Power and Light Co., Arkansas Game and Fish Commission, United Gas Pipeline Company of Louisiana, many others.

Send for Free Literature . . . Now

Find out how RCA Microwave can help solve *your* communications problems. Just clip and mail coupon . . . *today.*

RCA Engineering Products
Dept. 45 CE, Camden, N. J.

Please send me, without obligation, full story on how new RCA Microwave can give efficient, all-weather communications without pole lines, easements, or line maintenance.

Name_____

Title_____

Firm_____

Address_____

City_____ State_____

MICROWAVE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal.

NEW EQUIPMENT

Area Illumination

This area illumination system is a complete fluorescent system that gives freedom of choice as to size, shape, shielding, intensity, periphery, and can be combined with any acoustical treatment. Manufacturer claims this new system is economical, efficient, and easy to install.

It is claimed that for the first time the architect, engineer, or designer can determine the size of the illuminating area, pattern of his illuminating area, the intensity of quality of light desired from this illuminating area, the type of shielding media for this illumination and whether a self-contained periphery is desired.

Smithcraft Ltg Div, Chelsea, Mass.

Colored Fluorescent Tubes

A new lighting unit which uses colored fluorescent tubes produces a light effect equivalent to true daylight. The unit, known as Spectro-Lite, blends the primary colors of the spectrum producing a white light with the same temperature as that of natural daylight.

John P. Filbert Co., Inc, 2007 So. Vermont Ave, Los Angeles 7, Calif.

25 Cycle Dust Collector

The Dustkop dust collector designed for the out-of-doors exhaust of air that has been cleaned of industrial dust, but which still contains toxic fumes, is now available for use on 25 cycle power.

Capacity of the unit according to the manufacturer is 2450 cfm on a single 6-in. inlet, with a 4.5-in. static suction. The size of outlet for discharge of cleaned air to atmosphere is 8 in.

The unit is recommended by the manufacturer for almost any type of industrial dust such as those generated in buffing, woodworking, chemicals, etc, or from conveying, mixing, and handling.

Aget-Detroit Company, Ann Arbor, Michigan

Meter Mounting Device

This new heavy-duty meter mounting device has a maximum current carrying capacity of up to 200 amp. The device can be used with any standard 4 or 5 terminal self contained socket type meter.

Bolt type pressure connectors take line conductors in sizes from No 6 to 4/0. Unit features a transparent acetate shield for safety during installation or testing. By-pass clamps permit removal or testing of meter without interrupting the load. Cover cannot be closed with clamps in place.

Murray Mfg Corp, 1250 Atlantic Ave, Brooklyn 16, N. Y.

Mercury Lamp

A general service mercury lamp, the 400-w R-52 bulb has its own built-in reflector. Another advantage of the bulb is that little dirt collects on the face, where the light is emitted.

A companion lamp is identical in appearance but contains a phosphor on the inside of the bulb face to improve the color qualities of the bulb.

General Electric Co, Nela Park, Cleveland 12, Ohio

HUBBARD 4-WAY
WOOD STRAIN INSULATORS
for
maximum strength

Large arrows indicate direction of pull. Small arrows show the direction of resultant forces on wood member when strain is applied. Pressure is inward on all sides of the wood.

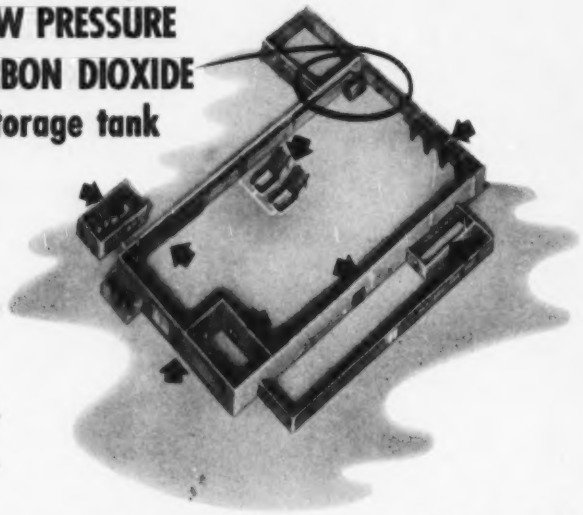
WHEN TENSION is applied to the Hubbard Wood Strain Insulator, the interlocking plates move forward simultaneously, and the inclined planes under the heads and nuts of the assembly bolts move uniformly inward, exerting a pressure in a direction 90-degrees to the line of pull on all four sides of the wood member. The design takes advantage of a higher percentage of the fibre strength of the wood than any other type of wood strain insulator.

The end plates almost completely enclose the wood, preventing end-checking over long periods of service. The wood member and the mechanical attachments of the fittings to the wood are the strongest parts of the strain insulator. When pulled to destruction, failure occurs at the clevis end of the attachment strap. This is desirable, as the strength of these straps is fairly constant and can be predetermined, whereas wood, and attachments to wood are variable as to strength properties, especially over long periods of exposure.

HUBBARD AND COMPANY
ESTABLISHED 1843
PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA
"Hang the Load on Hubbard Hardware!"

Plant-Wide Fire Protection

from a single LOW PRESSURE CARBON DIOXIDE storage tank



Now, your larger size fire hazards can be protected more efficiently at less cost, thanks to C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area . . . to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Flexibility is the keynote of these new type C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons . . . discharge facilities can either be manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs. Future plant expansion is easily and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank and adding the supplementary discharge facilities at a later date.

C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems are built with the same superior design and high quality workmanship that have characterized C-O-TWO High Pressure Carbon Dioxide Type Fire Extinguishing Systems for many years. Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

So, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning fully approved fire protection facilities for your various properties. Complete free information and descriptive literature is yours for the asking. Get the facts today!

C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

Hot Stick Trailer

This light-weight hot-stick trailer will meet the needs of many hot-line crews. It reportedly can carry sufficient tools for most straight-line maintenance jobs plus a limited supply of dead-end tools. Racks on the side carry ten hot sticks ten feet long.

A sliding steel rod supports the front end of this trailer when the pintle eye hitch is released from the towing vehicle.

A. B. Chance Co, Centralia, Mo.

Resistance Bridge

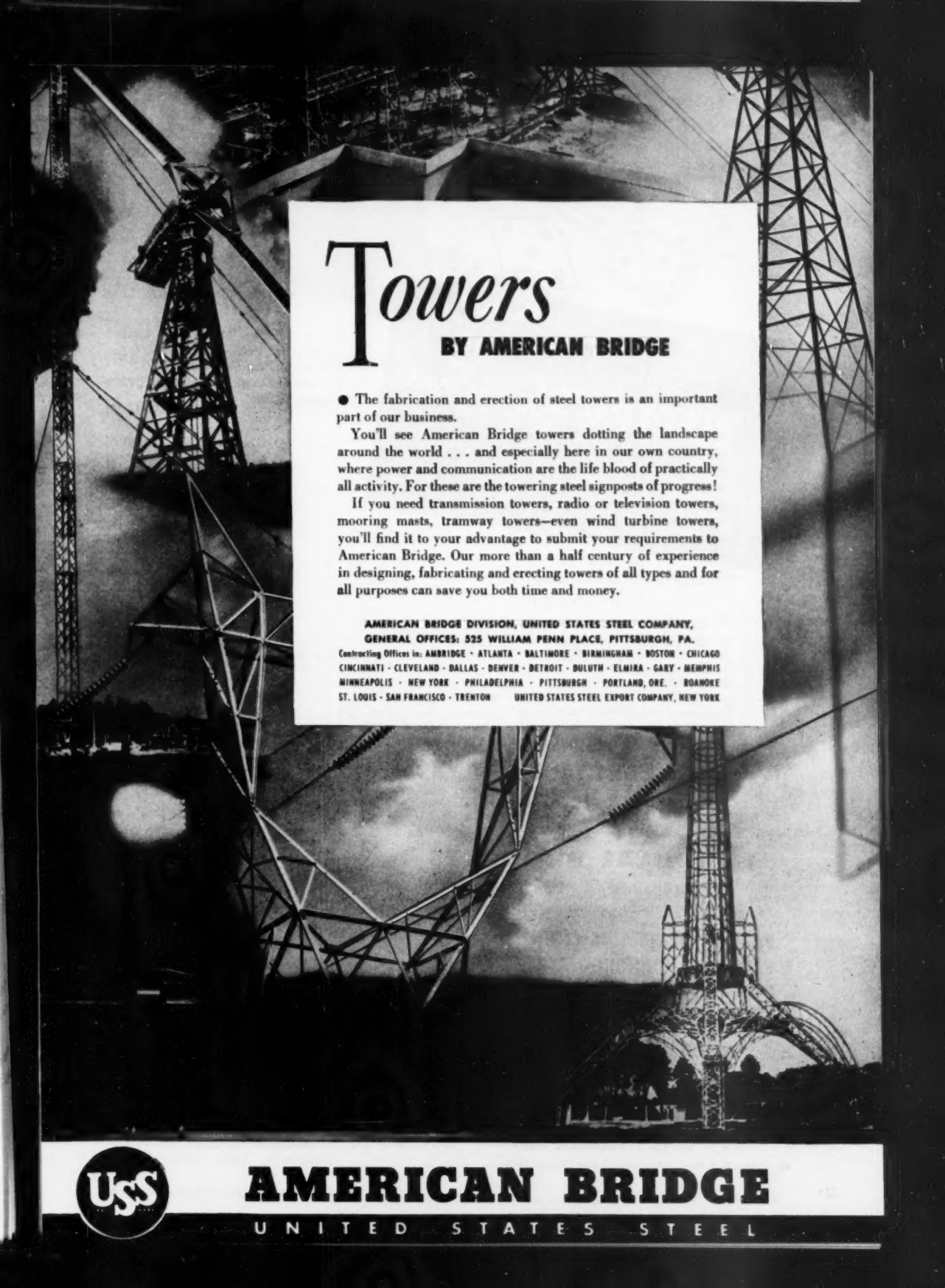
A new resistance limit bridge, the Type 1652-A, indicates on a large panel meter deviation of unknown resistors. Deviation can be measured from an external standard or an internal standard adjustable from 1 ohm to 1,111,111 ohms in steps of 0.1 ohm.

General Radio Co, 275 Massachusetts Ave, Cambridge 39, Mass.

Service Fitting

A revised line of service fittings for use with Nepcoduct underfloor wiring has been developed. The horizontal housing is equipped with a bushed opening and has wiring space within the housing itself.

A feature is the exterior locking facility provided by the imbedding



Towers

BY AMERICAN BRIDGE

● The fabrication and erection of steel towers is an important part of our business.

You'll see American Bridge towers dotting the landscape around the world . . . and especially here in our own country, where power and communication are the life blood of practically all activity. For these are the towering steel signposts of progress!

If you need transmission towers, radio or television towers, mooring masts, tramway towers—even wind turbine towers, you'll find it to your advantage to submit your requirements to American Bridge. Our more than a half century of experience in designing, fabricating and erecting towers of all types and for all purposes can save you both time and money.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL COMPANY,
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON · CHICAGO CINCINNATI · CLEVELAND · DALLAS · DENVER · DETROIT · DULUTH · ELMIRA · GARY · MEMPHIS MINNEAPOLIS · NEW YORK · PHILADELPHIA · PITTSBURGH · PORTLAND, ORE. · ROANOKE ST. LOUIS · SAN FRANCISCO · TRENTON UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMERICAN BRIDGE

UNITED STATES STEEL

DON'T GAMBLE!

- Improved thermal endurance
- High dielectric strength
- Excellent thermal conductivity
- Top tensile strength
- Rot repellent
- Resists chemicals and acids
- Good moisture resistance

GLASS VAR is available in rolls, sheets and tape.

ELECTRO

TECHNICAL PRODUCTS

You will find these other Class "B" Electro products tops in quality and performance

VARNISHED ASBESTOS CLOTH
VARNISHED QUINORGO ASBESTOS PAPER
QUIN-GLASS HI-TEMPERATURE INSULATION

Electrical equipment manufacturers are invited to use our Special Service facilities. Write or phone and we'll be glad to help you with your problem and send you technical data, samples, etc.

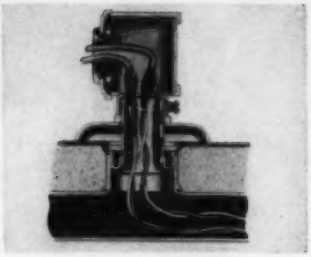
You may buy with confidence when you buy

ELECTRO-TECHNICAL PRODUCTS

DIVISION OF SUN CHEMICAL CORPORATION

NUTLEY 10, NEW JERSEY

*T. M. Reg. U. S. Pat. Off. by Owens Corning Fiberglas Corp.



type set screw which, easily handled from the outside, locks the fitting in any desired position.

National Electric Products Corp, Pittsburgh 19, Pa.

High Current Amprobe

A new high-current Amprobe voltammeter that measures up to 1200 amp, yet can be carried in the coat pocket, has just been introduced.

Of the snap-around type, it measures current instantly without being connected to the conductor. A new transformer design discounts error due to position of conductor within the probe jaws.

Ammeter ranges from 0-15 amp to 0-1200 amp ac, and voltage ranges from 0-150/300/600 volts ac are available.

Pyramid Instrument Corp, Lynbrook, N. Y.

Electric Meter Truck

More efficient meter maintenance procedures are achieved with this new meter truck. Meters are more acces-

Tubes made by Accurate Paper Tube Company using Quinterra Type 3.

PROOF
ACCURATE PAPER TUBE CO.
SPIRAL WOUND TUBES FOR THE ELECTRICAL INDUSTRY
KRAFT-FIBRE-CELLULOSE ACETATE-ASBESTOS
SQUARE • ROUND • RECTANGULAR
850 N. NOBLE STREET
CHICAGO 22, ILLINOIS
Mr. H. F. Pokorney
Johns-Manville Sales Corp.
Merchandise Mart Plaza
Chicago 54, Ill
September 21, 1951
Dear Mr. Pokorney:
We thought you would like to know about the excellent performance being reported for our spiral-wound tubes made of silicone-treated Quinterra Type 3.
Manufacturers of transformers and magnet coils wound on Quinterra Type 3 tubes find that the equipment can operate continuously at temperatures up to 200 degrees C with no damage to the tubes.
Bell ringing and control transformers wound on Type 3 tubes can be designed to burn out under short circuit and still withstand 1500 volt potential from coil to ground.
Tubes are made in a full range of sizes for coil and transformer applications.
Very truly yours,
ACCURATE PAPER TUBE CO.
Leon Lovinthal
Leon Lovinthal

HERE'S PROOF THAT YOU CAN MAKE INDUCTION EQUIPMENT

Safer... Smaller... at Lower Cost...

with silicone-treated *Quinterra** TYPE 3

(A purified Asbestos Class H sheet insulation)

Photograph above shows two signal corps transformers having same rated output—illustrating savings in space and materials made possible by use of silicone-treated Quinterra.

(Photo — Courtesy Chicago Transformer Division, Essex Wire Corporation.)

As the above letter from the Accurate Paper Tube Company testifies, users of this newest Johns-Manville electrical insulation find that it raises overload limits and assures greater safety.

And as you can see from the photograph at left, Quinterra Type 3 also permits important savings in both space and materials . . . a fact substantiated by leading manufacturers of quality transformers.

You can not only improve your induction devices with Quinterra Type 3 . . . but you can also reduce the total cost of production because rejections will be minimized.

Silicone-treated Quinterra Type 3 is a high grade Class H dielectric . . . ideal for both interlayer and wire-wrapping insulation as well as the formation of tubes. It has outstanding moisture resistance, high temperature stability, and electrical characteristics—plus flexibility and adequate physical strength for many applications.

Quinterra Type 3, like all treated Quinterras, is made from a completely inorganic base sheet of purified asbestos that has a hole-free closed structure. This sheet has an inherent dielectric strength of at least 200 VPM which is retained even under temperature of 400 C. The silicone-treated sheet maintains a dielectric strength of at least 225 VPM under continuous exposure to temperatures in excess of the Class H maximum, 180 C.

If you have a problem that Quinterra Type 3 may solve, why not consult our sales engineers—without obligation? For samples and additional information, write Johns-Manville, Box 290, N.Y. 16, N.Y.

*Quinterra is the registered trade mark of Johns-Manville's purified asbestos electrical insulation.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville ELECTRICAL INSULATIONS

THE Big 3 IN WESTERN POLES

- produced
- treated
- sold by...

J. Neils Lumber Company

Look to the West for transmission and telephone poles... To western Montana, where much of America's finest virgin timber is located...To the J. Neils Lumber Company plant at Libby.

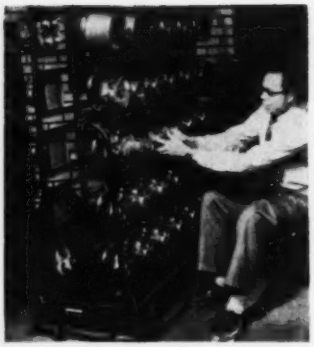
Long a quality manufacturer of forest products (since 1895) J. Neils is a major producer of power and telephone poles.

At Libby, Montana, in the heart of a great forest empire, J. Neils manufactures and treats the poles that come from magnificent stands of Western Larch, Lodgepole Pine and Douglas Fir. This modern pole treating plant measures up to the highest quality standards in men, materials, equipment and methods.

An illustrated folder on J. Neils treated poles, and information regarding their application to your requirements, will be furnished gladly on request.

J N **J. Neils Lumber Company**

Pole Division: LIBBY, MONTANA

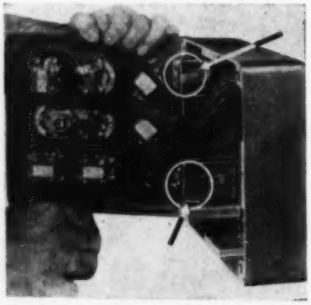


sible, are up away from damage, and are stored orderly and neatly.

Vertical uprights at ends are wider apart at the bottom so meters rest conveniently on sturdy channel kick bars. Corner handles extend to top for full protection to all meters.

Truck handles up to 60 meters and is 52-in. long, 24-in. wide, and 67-in. high.

Service Products Co, 1008 So. Bowen St, Jackson, Mich.



Control Station

A newly designed oil-tight control station in six, nine, twelve, and sixteen unit sizes, features a hinged cover to facilitate wiring and maintenance.

The cast enclosure is provided with a composition gasket between the box and cover to insure an air-tight seal. The hinged cover does not affect the oil-tight seal between box, gasket, and cover.

Square D Co, 4041 No. Richards St, Milwaukee 12, Wisc.

Oil Resistant Tape

This new oil-resistant tape is used for rapid insulation build up on splices in large power cables. Made of syn-

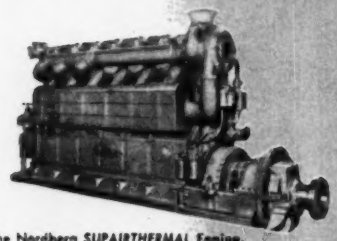
FOR THE BEST SOLUTION TO YOUR POWER PROBLEMS...

LOOK TO NORDBERG

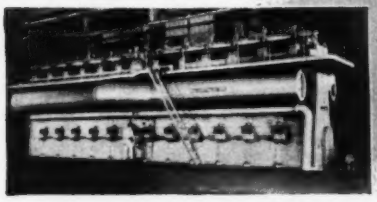
—builders of America's largest line of

HEAVY DUTY DIESEL ENGINES—

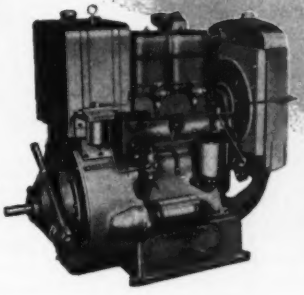
10 TO 10,000 HORSEPOWER



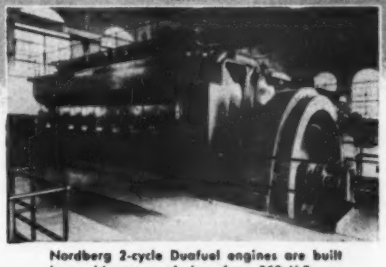
The Nordberg *SUPAIRTHERMAL* Engine, the latest development in the Diesel field, is available in a complete range of 4-cycle types for all applications, in sizes from 425 to 3200 H.P.—including Diesel, Duafuel, or spark fired gas operation.



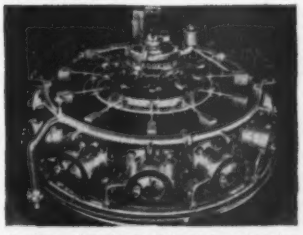
Nordberg 2-cycle Diesels for marine or stationary service are built in a wide range of types and sizes, from 880 to 10,000 H.P.



Nordberg "Packaged" Diesel Power Units—from 10 to 45 H.P., 9 to 30 K.W., for generating electricity, pumping, and straight power applications.



Nordberg 2-cycle Duafuel engines are built in a wide range of sizes from 880 H.P. upward—all of which burn oil, gas, or any combination of both — and are instantaneously convertible from one fuel to another, under full load.



Nordberg 2-cycle Radial engines develop 2125 H.P. or 1500 K.W. at 400 R.P.M. Available as an oil burning Diesel, as a natural gas engine, and as a Duafuel engine.

IN the complete line of Nordberg two and four-cycle oil burning and Duafuel Diesels and gas burning engines, you will find the right size and type of unit to meet your power requirements.

From the smallest to the largest engine, every Nordberg unit is built to deliver low-cost, dependable power . . . and the basic dependability of Nordberg engines has been amply proved in service on hundreds of successful stationary and marine power applications all over the world.

If you're planning on adding to your present power capacity, or providing new power facilities, it will pay you to investigate the long life and dependable service you get with Nordberg Engines. Write for further details, outlining your power requirements.

NORDBERG MFG. CO., Milwaukee, Wisconsin

P-SHM152

BUSCH-SULZER
A DIVISION OF NORDBERG

NORDBERG
DIESEL ENGINES

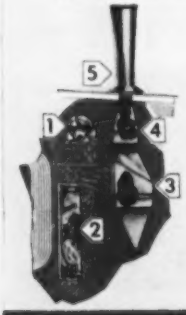
COLLECTS MORE DUST

VALMONT TYPE S

With Prat-Daniel Dust Collectors, an extremely high percentage of the ultra-fine particles are removed from the gas stream. Long, narrow inlets on tubes of small diameter produce high efficiency even at reduced loads. The low velocity reduces erosion and combined with wear-resistant steel construction gives P-D collectors the desired combination of high efficiency and exceptionally long life.

All types of P-D Collectors meet the requirements of most dust ordinances; the high efficiency of the Valmont Type S, however, exceeds the requirements of many of the most stringent ordinances.

"Uni-block" construction, with complete tube sections assembled at the factory, makes relatively low installation costs possible. Hundreds of installations have proved P-D Collectors' all-'round efficiency and low maintenance costs provide a high return on investment. Get the best in dust collectors for your plant. Write our Sales and Project Engineers for Catalog No. 250S.



UNIT RESPONSIBILITY

Prat-Daniel, through its sales and project engineers, The Thermix Corp., offer a complete complement for handling the air gas stream shown at left; 1. Forced Draft Fans, 2. Air Preheaters, 3. Tubular Dust Collectors, 4. Induced Draft Fans and 5. Fan Stacks. This unit responsibility, by a well-known firm, relieves the engineer of the responsibility for one of the most important functions in a steam generating plant.

Sales and Project Engineers

THE THERMIX CORPORATION

GREENWICH, CONN.

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec
50 Abell St., Toronto 3, Ontario

Designers and Manufacturers

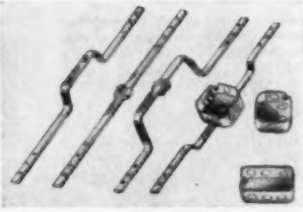
PRAT-DANIEL CORPORATION

SOUTH NORWALK, CONN

thetic rubber, it provides greater dielectric strength and resistance to high temperature than natural rubber tapes.

Dielectric strength is 15-kv unstretched, and 10-kv at 500% elongation. It has an electrolytic corrosion factor of 1.0 and an insulation resistance of 100,000 megohms. Tape is not designed as sole insulation.

Minnesota Mining & Mfg Co, 900 Fauquier St, St Paul 6, Minn.



Bar Hangers

Four types of bar hangers have been added to the Keystone line of electrical products. The hangers are available in straight, shallow, deep or universal offset types as separate units or in combination outlet box and bar hanger assemblies.

Keystone Mfg. Co, 23328 Sherwood Ave, Center Line, Mich.

Industrial Erector Set

DexAngle, a 10-ft long, 3 x 1.5 x .080-in. slotted-leg galvanized steel angle designed for all-purpose industrial fabrication is now available in U. S.

Lengthwise rows of slots permit rapid assembly by bolting of shelving, bins, scaffolding, ladders, assembly tables, motor and machinery mounts, and other plant equipment.

A hacksaw and a wrench are the

(*Continued on page* 182)

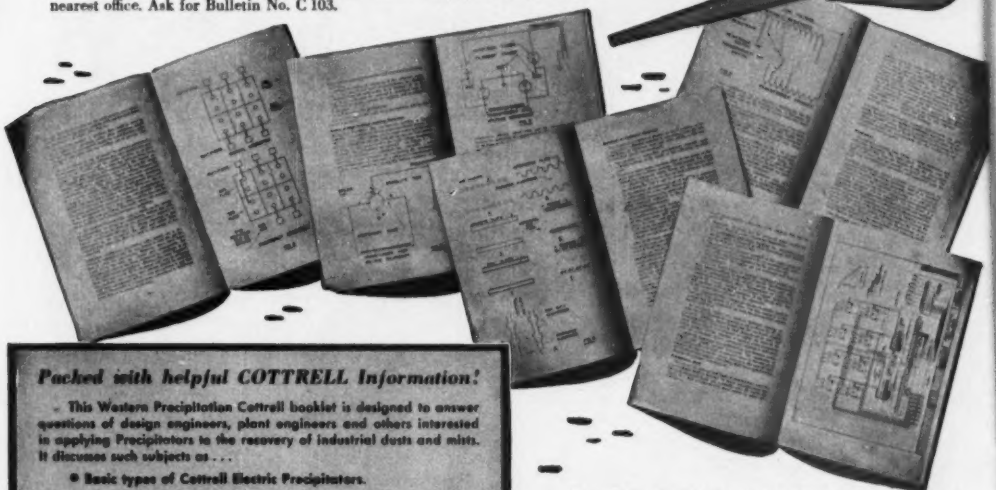
FREE

From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.



Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

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...in all parts of the U.S.A. and foreign countries.

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PYROTENAX®

SAFETY m.i. WIRING is available with fittings to connect to standard boxes and equipment.

SIZES 16 TO 4/0 A.W.G. | SIZES 16 TO 4 A.W.G. | SIZES 16 TO 4 A.W.G. | SIZES 16 TO 6 A.W.G. | SIZES 16 TO 10 A.W.G.

permanent
ELECTRICAL WIRING

...Wiring that will actually outlast the buildings in which it is installed.

Whatever the service, wherever the installation, if the job deserves the ultimate in quality of the wiring material, nothing less than a Safety m.i. Wiring System will suffice.

Uni-drawn, self-protected Wiring System, with dry mineral insulation offers the utmost in permanence, service-reliability and safety in all applications up to 600 volts.

As shown, this new General Cable wiring installs easily, with standard boxes, switches, etc. Its advantages are so unusual, so important that you will want to read this summary,..and should.

*Exclusively a General Cable product

OUTLASTS STRUCTURE IN WHICH INSTALLED!
Immune to age-deterioration due to its "all-mineral" construction. Unaffected by high temperatures resulting from current overloads, either accidently imposed or to meet emergency increased power demands.

ONE-STEP INSTALLATION!
No additional mechanical protection required. Safety m.i. Wiring is its own conduit, installed in one operation with standard switch and junction boxes. Smaller diameter saves space, gives neat appearance.

NO VAPOR PASSAGE!
Completely filled with compacted mineral insulation. No need for specially installed seals in the cable run normally required to prevent the passage of combustible gases through a wiring system.

COMPLETELY MOISTURE-PROOF!
Simple fittings permanently seal both ends of each run of wiring. No possible entrance for moisture. Normal concern over this hazard is, thereby, completely eliminated.

RIGID YET FLEXIBLE!
Thumb-pressure bending, in ordinary sizes, easily fashions orderly wall patterns — conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, Safety m.i. Wiring stays put rigidly.

NO HEAT DETERIORATION!
The mineral insulation of Safety m.i. Wiring is physically stable up to 2800° C., thereby assuring against deterioration by heat, even beyond the melting point (1083° C.) of the copper sheath.

Note the smooth transition bends in this bank of power plant circuits.

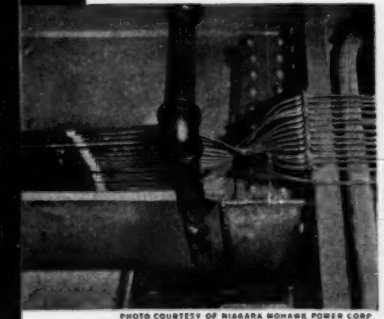

PHOTO COURTESY OF NIAGARA MOHAWK POWER CORP.

Typical close-up of machine wiring, smooth, easily kept clean — and of small diameter.

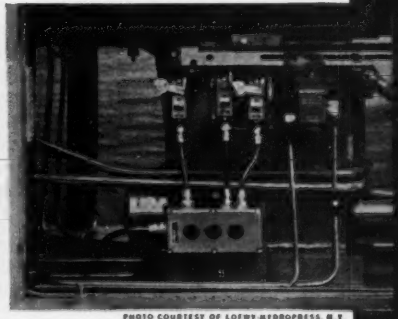

PHOTO COURTESY OF LOEBY-HYDROPRESS, N.Y.

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"More Power to You"®

the fuse with Nine lives

NEW

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C-Q-T*

CONSERVES ITS LIFE— BLOWS ONLY WHEN NECESSARY

MADE TO MEET THE NEED

Dishwashers, Heaters, Washing Machines, Refrigerators, Deep Freezers, Irons and countless other modern household appliances all put heavy starting loads on branch circuits. As a result, most ordinary fuses *blow unnecessarily*. This means great inconvenience for the householder and many needless and unprofitable service calls. Chase-Shawmut's new **C.Q.T.** is a fuse that gives *longer safe time-delay on overload and consequently blows only when necessary*. It is *faster* protection on short circuit, too. Made especially to meet modern needs, as determined by the largest utility companies in the United States, **C.Q.T.** is the greatest advance in household fuses since 1900.

APPROVED BY UNDERWRITERS LABORATORIES

C.Q.T. is made in standard plug-type form to fit all standard fuse sockets. It is available in standard 15- 20- 25- and 30-Amp sizes. *Color-Coded for Convenience* (at slight extra cost), C.Q.T. can be ordered by color. Blue = 15 Amp; Orange = 20 Amp; Red = 25 Amp; and Green = 30 Amp.

SERVE CUSTOMERS BETTER—STOCK C.Q.T. NOW

Power Companies, Wholesalers, Contractors, Direct Buyers — Investigate these amazing new fuses at once. Write for free bulletin. Ask for prices. Samples on request.

*T. M. Registered

C-Q-T — *Aunt At The Switch*

THE **CHASE-SHAWMUT CO.**

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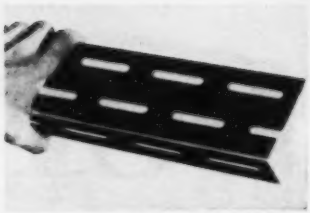
Est. 1900

Amptrap Trion -td- C-Q-T Trimet -O-T- FUSE WIRE



only tools needed for assembly. When used as uprights in lengths to 5½ ft, angles will support to 1200 lb. C-channels, T-sections, Z-sections, I-sections, and box sections can be also made from DexAngle.

Acme Steel Co, 2840 Archer Ave, Chicago 8, Ill.

Continuity and Leakage Tester

The Audiotone continuity and leakage tester has been developed recently. The tester produces an audiotone the frequency of which depends on the value of electrical resistance of the circuit element being tested.

Unit can be used as a continuity tester, an electrical contact indicator, a leakage tester, an audible alarm, a tone source and as a polarity tester for dc.

Peschel Electronics, Inc, 13 Garden St, New Rochelle, N. Y.

Electronic Meters

The four meters are a voltmeter, ammeter, wattmeter and varmeter (clockwise) operating as an integrated unit.

Meters are particularly useful for measuring power consumption of networks, motors, etc without resorting to corrections. Meters are driven by negative feedback amplifiers so that the burden is neglected in meter readings.

Scales can be supplied for individual

Now plastic tape helps turn night into day!

See that compact base? It supports one of the new aluminum-pole fluorescent street lights recently installed in Schenectady, N. Y. How would you insulate 5000 volt lead-ins to ballast transformers in a tight spot like that? General Electric Company did it with "Scotch" Electrical Tape No. 22, and the results are completely satisfactory. Here's why it works so well:

Plastic tape combines extra-high dielectric strength with thin caliper. That means it takes less room than conventional insulating tapes to do a better job.

And it does a better job because it resists water, prevents shorting. Acids, oils and alkalies don't affect it, either. The stretchy plastic backing forms a tight seal over odd shapes and curves—moisture is kept out for good! Try it yourself and see. Your wholesaler can supply a variety of widths. Order today!

QUICK FACTS about "SCOTCH" Electrical Tape No. 22

- **HIGH DIELECTRIC**—it's over 10,000 volts.
- **TOUGH**—plastic backing resists weathering, sunlight, acids, oils, alcohols, alkalies.
- **STRETCHY**—conforms snugly to any surface.
- **THIN CALIPER**—only .010 inch thick.

Minnesota Mining & Mfg. Co.
Dept. EW-32, St. Paul 6, Minn.

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FREE BOOKLET gives you physical and chemical properties of four of the many "Scotch" Electrical Tapes. Use coupon above, or mail a postcard today! Address: Minnesota Mining & Mfg. Co., Dept. EW-32, St. Paul 6, Minnesota.

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: 270 Park Avenue, New York 17, N. Y. In Canada: London, Ont., Can.

A Big Draft Job Handled Capably by Green Fans

Twenty-four large Green Fans take care of a heavy draft load at the Venice (Illinois) Plant of the Union Electric Co. of Missouri. Each of six boilers has two sets of Green Fans, each set consisting of one induced draft fan and one forced draft fan coupled to one motor as a unit. With the heavy demands on this station, all boilers are usually in service continuously, thus throwing an unrelenting burden on the fans.

Engineers whose responsibility it is to recommend or accept draft fans for large power plants certainly want efficiency and low operating costs. But they don't overlook the maintenance and replacement angles. They want the sound designs of competent experienced fan engineers. They also want the care in construction that is found in shops of a company that has built up an international reputation as the "authority" on draft fans. They know that such a company will not tolerate sloppy shop work.

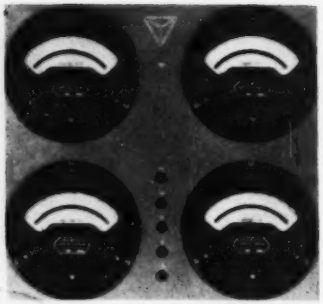
Green is this authority on mechanical draft fans.

Have You a Copy of Our Fan Bulletin No. 168? If not, we shall be glad to send you one.

THE GREEN *Fuel Economizer* COMPANY INC.

BEACON 3, NEW YORK

ECONOMIZERS • FANS • AIR HEATERS • CINDERTRAPS



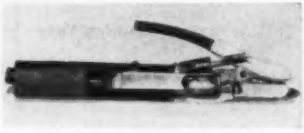
requirements. Three voltmeter scales coordinate with 3 ammeter scales to indicate 5 wattmeter and varmeter scales.

System Analyzer Corp, 1327 Market St, Milwaukee 2, Wisc.

Corona Protected H V Resistor

The new Type 1001 high-voltage resistor secures voltage drops from 5 to 100 kv, involving maximum current drain of 1 ma. Housed in a spun-aluminum corona shield, unit has 5 series-connected 1-megohm resistors rated at a precision of 0.1% at 74F.

Astro Electric Co, 1302 County Rd, Belmont, Calif.



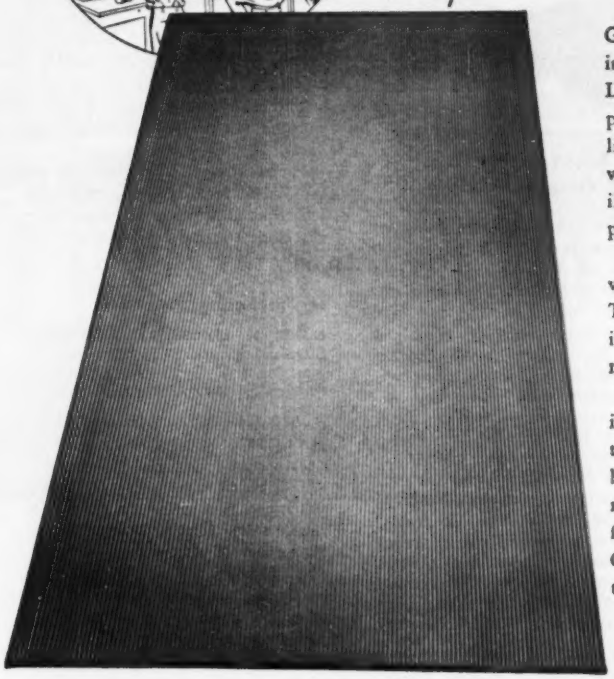
Electrode Holder

The new Caddy type B-500 amp insulated electrode holder weighs only 25 oz. Features are cable gripper at the rear of the steel body which prevents flexing at the weld and eliminates insulating the connection.

Erico Products, Inc, 2070 E 61 Place, Cleveland 3, Ohio

for excellent **FUNCTIONAL** *lighting . . .*

CORNING'S CRYSTA-LITE!



Good functional lighting directs maximum light into the working zone. Corning's CRYSTA-LITE prismatic lens panels do even more. Linear prisms eliminate high-level glare of fluorescent light by bending the high-angle rays downward into zones where they are most useful for illumination—giving you more light for seeing plus accurate brightness control.

Lightweight CRYSTA-LITE is made of water-white crystal glass and is not color selective. There is no distortion of the color source, making surroundings more pleasing . . . merchandise more appealing.

Especially suitable for long runs as well as individual fixtures, it is available in widths up to 24", lengths up to 100". CRYSTA-LITE may be obtained from leading fixture manufacturers, many of whom feature CRYSTA-LITE in their fixtures. For further details on all types of Corning engineered lightingware, send for Bulletin LS-32; Photometric sheets also available.

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Please send ☐ Bulletin LS-32 describing CRYSTA-LITE; ☐ Photometric sheets.

Name_____ Title_____

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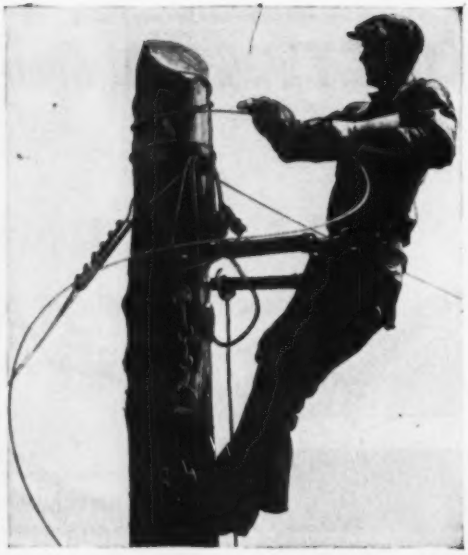
Has What It Takes



For Guys, Messenger and Overhead Ground Wire

EXPERT linemen know, when they use *Crapo* Galvanized Steel Strand, that it will meet every requirement the job demands. For *Crapo* Galvanized Strand "has what it takes" — *strength, ruggedness, workability, long-life.*

These essential characteristics, combined with ever important ECONOMY, make *Crapo* Galvanized Strand first choice for guys, messenger and overhead ground wire. The superior tensile strength of the steel is utilized to fullest advantage in each size and grade. The heavy, ductile, tightly-adherent galvanized coating — applied by the famous *Crapo* Process — provides dependable protection for the steel, prolongs the expectant life of the strand.

The all 'round reliability and overall economy of *Crapo* Galvanized Strand are matters of record with leading strand users. Such records contain ample and significant proof of the long life and low annual cost of this strand in service.

Available for Prompt Delivery

There is a size and grade of *Crapo* Galvanized Strand for every practical need. Consult the distributor of *Crapo* Galvanized Products near you or write for further information!

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Crapo GALVANIZED STEEL STRAND

WHAT THEY'RE SAYING

At Industry Meetings

Executive Development

VIRGIL K. ROWLAND, personnel ass't-accounting, The Detroit Edison Co before Personnel Conference of American Management Association, Chicago, Ill.

There most certainly has been much progress in the field of management development. Statistically speaking, it might be considered the hottest thing today in back line and staff circles. Results are showing favorably in almost every attempt regardless of how simple or how complex the techniques.

Certainly with as many good brains as are presently interested in the subject and with the large number of top executives who are actually making it work in their companies, progress within the next few years will greatly outshine the progress of the last few years.

A specific technique must be used only on an individual who needs that technique to help him develop. Tailor-make the training for the individual.

Is Purchasing Prepared?

ELMER L. LINDSETH, president, the Cleveland Electric Illuminating Co, before Public Utility Buyers Group, National Association of Purchasing Agents

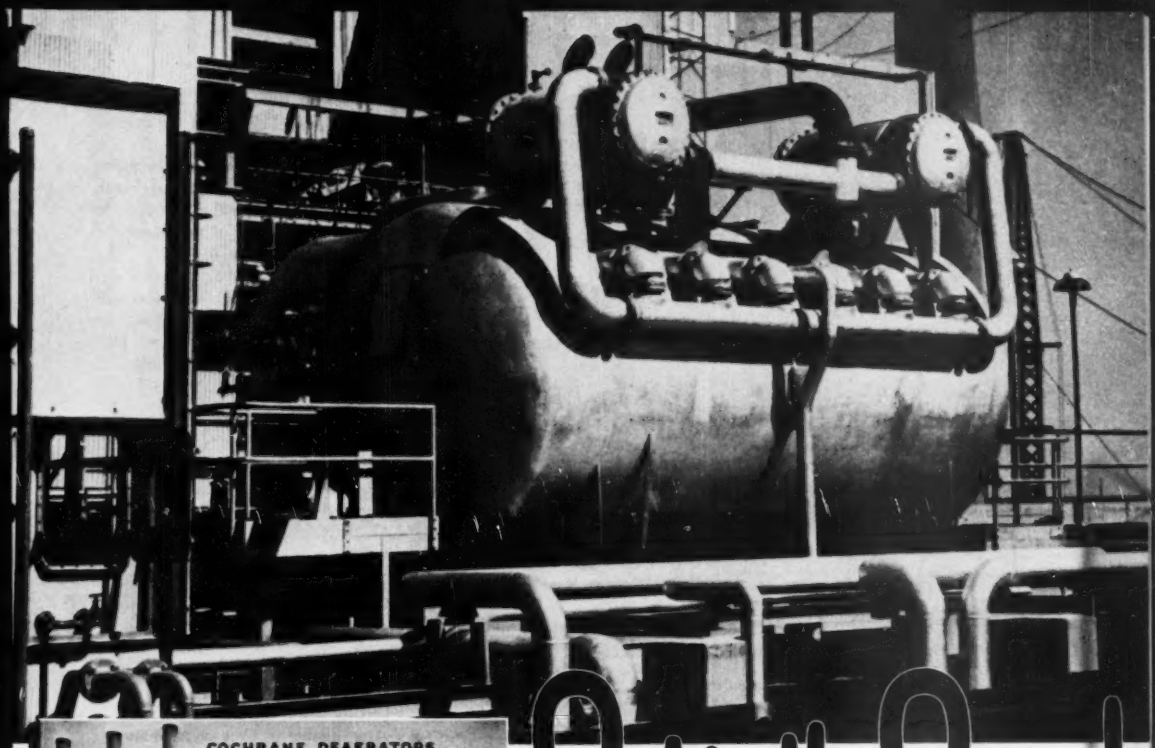
In this present period of rapid expansion, annual expenditures for construction and operation purchases at the average electric utility often amount to as much as 75 percent of annual sales. Purchases equivalent to 50 percent of annual sales are common. Under these circumstances the purchasing department may be responsible in one year for as much money as the electric utility pays out in employee wages and benefits in two years.

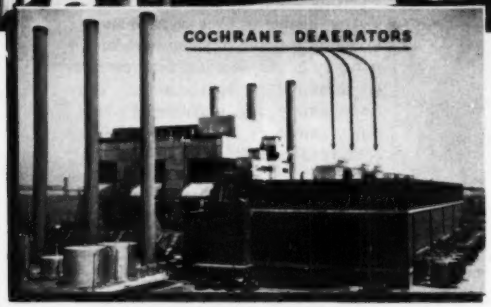
Purchasing agents must throw every effort into combatting runaway inflation. They must maintain effective command of purchase costs as well as deliveries.

Many utility companies are not fully measuring up to desirable management performance in the purchasing area. To correct this, here are some steps that can be taken:

1. Run day-to-day business operations successfully.

2. Make salaries and incentives





Out in the Open!

Cochrane Deaerators at P.G. & E.'s Contra Costa Plant

AT PACIFIC GAS & ELECTRIC COMPANY'S new Contra Costa steam plant at Antioch, California, three COCHRANE DEAERATORS are employed to deaerate the boiler feed water for the six 475,000 lbs./hr. steam generators.

The deaerators are of the Cochrane direct contact tray type with 1,176,870 lbs./hr. maximum flow, and 6300 gal. storage capacity. Each deaerator has two vent condensers and all three deaerators are mounted on the auxiliary bay roof, as shown in the large photo above and in the inset panel. In the heating cycle, the Cochrane Deaerators function after the No. 5 closed heater at a designed operating pressure of 5 psig.

These deaerators are three of the fifteen Cochrane Deaerators purchased by P. G. and E., installed or now on order.

COCHRANE DEAERATORS whether tray-type, atomizing type or multi-stage type, are available for any deaerating need, for any size plant and for any location or space requirement. They are fully described in Cochrane Publication No. 3005, a copy of which will be gladly mailed on request to interested executives. Specific problems are also welcomed.

COCHRANE CORPORATION • 3146 N. 17th St. • Philadelphia 32, Pa.

In Canada: Canadian General Electric Co., Ltd., Toronto • In Mexico: Babcock & Wilcox de Mexico, S. A., Mexico City • In Europe: Recuperation Thermique & Epuration, Paris

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COCHRANE CORPORATION 89 YEARS OF SERVICE 1863 - 1952

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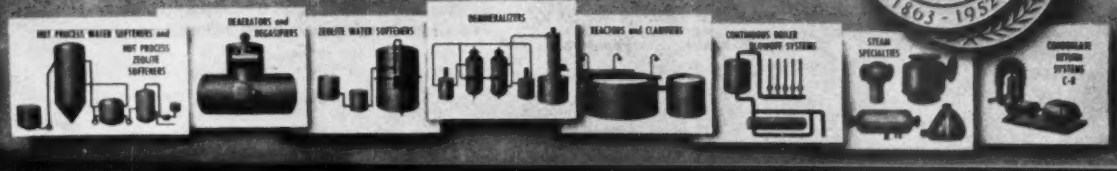
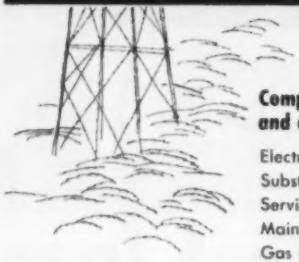


Design and Consulting Engineering



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Commonwealth is prepared to assist in:

System planning and long-range development programs based on load growth and economic factors

Plant location studies, including fuel supply and other requirements

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adequate to attract and keep high-potential people necessary for responsible purchasing positions.

3. Check recruiting and selection methods to see that they are both sound and hard-hitting enough to bring in the quality of personnel for which we're ready to pay.

4. Make certain an executive development program is offered that will not only assist the newcomer in handling his immediate job, but prepare him for greater responsibilities.

Electrical Standards Aid Purchasing

A. E. PRINGLE II, vice president, Pringle Electric Mfg Co before committee on standardization of National Assoc of Purchasing Agents in New York.

When electrical equipment is to be purchased it should be specified according to ASA, NEMA, AIEE or Underwriters standards. Equipment bought on this basis will meet nationally recognized standards and can be serviced by trained technicians wherever installed.

The number of lives saved annually by the proper use of safety standards, not only in the electrical field, cannot be measured in dollars alone. The responsibility for maintaining these safety standards is the responsibility of the purchaser of equipment.

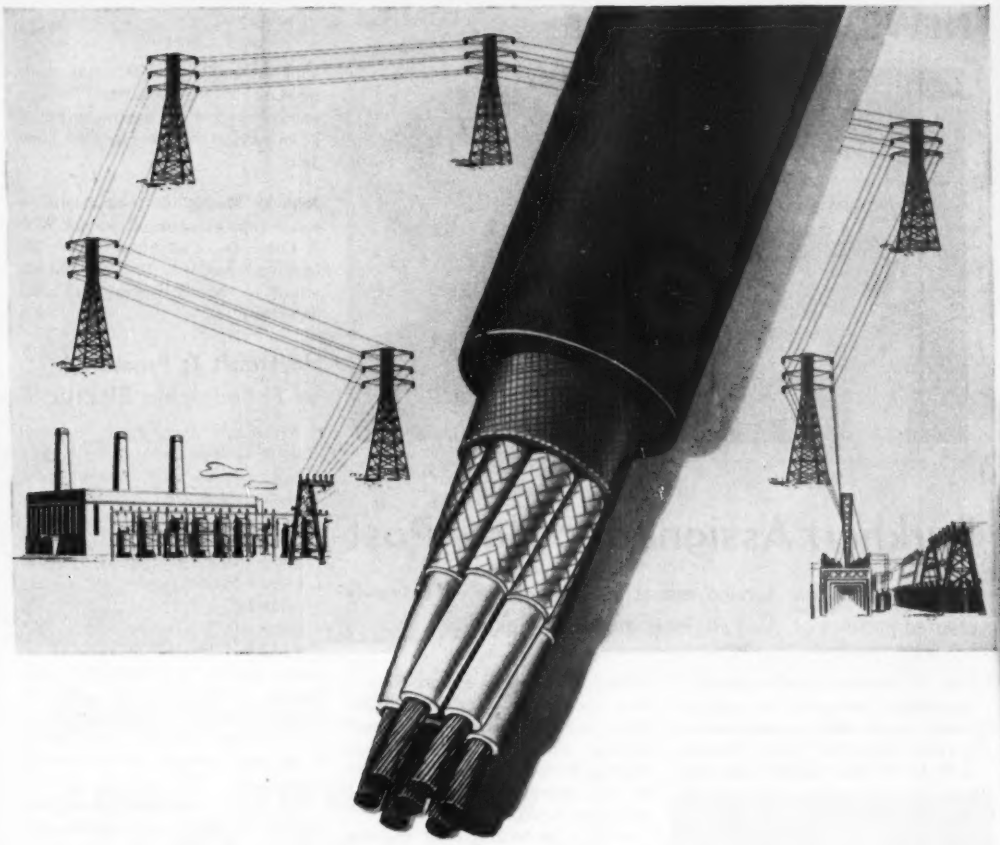
Guns and/or Butter

CHARLES SAWYER, Secretary of Commerce before Tallahassee Chamber of Commerce

The technology of modern warfare changes so rapidly that we cannot commit ourselves to produce in great quantities and to the limit of our capacities today, weapons that will become obsolete in a year or perhaps a little longer.

Our economic system is strong, and its reserves of strength are almost incalculable, but like other systems it can be destroyed unless we work to prevent it.

I do not claim that the program we have undertaken and carried on is perfect, nor perfectly performed. I do claim that it has been sound within the limitations which human frailty imposes. We are immeasurably stronger than we were a year and a half ago. We are approaching the point where our capacity to produce will permit us to reduce controls on many items.



NOT ONE FAILURE in over 20 years

Laytex®-Neoprene Supervisory Control Cables

There has never been a reported failure of Laytex-insulated control cable in its 20 years of manufacture. The insulation resistance of these cables actually improves in wet locations! The small diameter of Laytex makes unnecessary the enlargement of cable ducts where signal service is expanding. The neoprene jacket provides exceptional resistance to abrasion and other abuse, and is highly resistant to the action of oil, flame, and sunlight. The cables are light in weight, easy to install.

There is U. S. Control Wiring for every type of control, supervisory or metering problem. They are unexcelled in electrical qualities; dielectric strength and tensile strength are extremely high; low water absorption, high aging and moisture-resistant qualities. For more information write to address below.

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SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT • 1230 AVENUE OF THE AMERICAS, NEW YORK 20, NEW YORK

B. F. BURKHART

H. H. HUEVELMAN

Burkhart Assigned to New Post

Iowa Public Service names veteran employee to newly created position of chief engineer of system planning

B. F. Burkhart, chief engineer of Iowa Public Service Co, has been appointed to the newly created position of chief engineer of system planning. H. H. Huevelman, assistant chief engineer, has been named chief engineer, succeeding Burkhart.

In his new post, Burkhart will have charge of long range planning, negotiations with neighboring companies covering jointly owned transmission lines, and other projects. Huevelman will be in charge of the system's engineering department.

Entered Utility Field in 1915 . . . Burkhart started his career with Westinghouse Electric Corp and later worked with Western Electric Co. His first utility affiliation was in 1915 with Cedar Valley Electric Co, Clarksville, Iowa, a predecessor of Iowa Public Service. Since then he has been with Luzerne County Gas & Electric Co, Kingston, Pa., American Gas Co and United Gas Improvement Co, both at Philadelphia.

As a representative of Stone & Webster Engineering Corp, he had charge of electrical work in the construction of the 156,000-kw Bagnell Dam project in Missouri. He joined Iowa Public Service in 1931 as valuation engineer and was made chief engineer in 1933.

During his entire career, Huevelman has been associated with the utility industry, starting in the engineering department of Milwaukee Electric Railway & Light Co. Later he was superintendent of municipal utilities at New Ulm, Iowa.

In 1926 he became chief engineer for the Interstate Power Co and Central States Power Co, affiliated companies, with headquarters at Dubuque, Iowa. While with these companies, he went to Germany for a three-month period in 1930 to help conduct a survey investigation of utilities there.

He joined Iowa Public Service in 1938 after three years as a consulting engineer in Chicago. He served as assistant chief engineer until his promotion to chief engineer.

•

Joseph H. Johnson has been appointed assistant to the manager of the Stamford Division of Connecticut Power Co. He succeeds **Edward I. Rudd, Jr,** who is now principal assistant to the commercial vice president in charge of rates and research. Johnson joined Hartford Electric Light Co in 1936 and later became director of personnel. In 1946 he was appointed assistant to the general manager in charge of safety engineering and inspection. Rudd, who started with the utility in 1932, was made assistant to the Stamford Division manager in 1943. Connecticut Power is an affiliate of the Hartford company.

John M. Murray has been named assistant sales manager of Simplex Wire & Cable Co, Cambridge, Mass. He joined Simplex W&C in 1928 and has served in the engineering and sales departments.

Hartranft Is Promoted by Philadelphia Electric

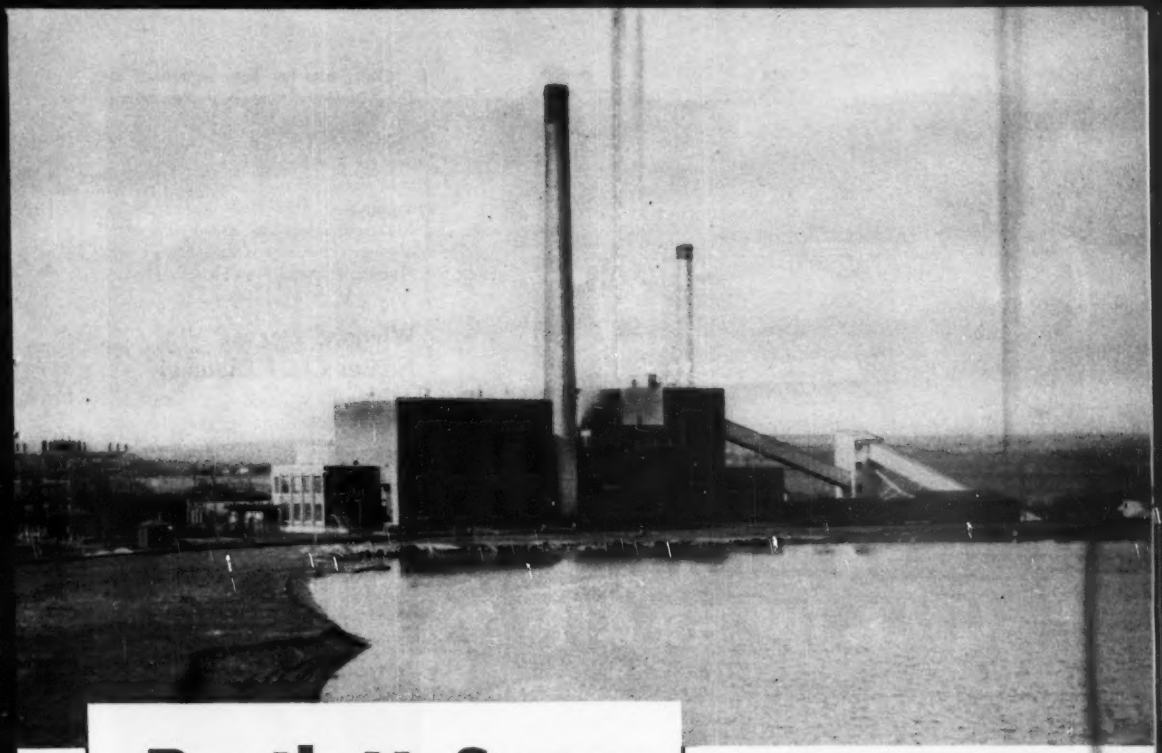
Armand C. Hartranft, assistant chief load dispatcher of Philadelphia Electric Co, has been appointed chief load dispatcher. He succeeds Henry A. Dryar who has retired from active service.

Stephen S. Clair was named assistant chief load dispatcher to replace Hartranft.

Hartranft began his career with Philadelphia Electric in 1920 as assistant operator at Hunting Park substation. Three years later he was transferred to Schuylkill substation as a switchboard operator, later serving in the same capacity at the Somerset substation.

He entered the load dispatching division in 1924 as an assistant load dispatcher and a year later was promoted to load dispatcher. In 1934 he was named supervisor of the load dispatching division and served in this position until 1939, when he was appointed to the post of assistant chief load dispatcher.

A. C. HARTRANFT



General View of Bay Front Steam Plant
Lake Superior District Power Co.
Sargent and Lundy
Consulting Engineers

Bartlett-Snow coal handling at Ashland

● The illustration above shows the first 38,600 KW unit of a plant which is to be extended into a 60,200 KW station. Coal is received by lake boat at a near-by deep water dock, and carried to the plant in railroad cars. All handling facilities including the track hopper and grillage, duplex feeder, conveyors, gallery, chutes, tripper and all supporting structures, were fabricated in our shops and installed by our erectors to Sargent and Lundy specifications. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers work with you on your next job.

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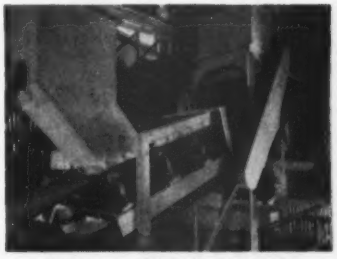

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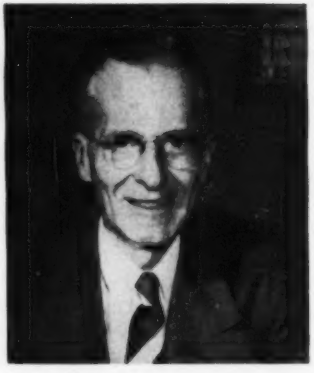
Clair, who has been supervisor at the Chestnut Street load dispatching division, started with the utility in 1925 as an assistant substation operator at Hunting Park substation. He was advanced to substation operator a year later at the time of his transfer to Ogontz substation. During the next six years he served as operator at Hunting Park and Ludlow substations.

Wiegand Elects 2 VPs, Names Chief Engineer

Edwin L. Wiegand Co, Pittsburgh, has announced the appointment of

JOSEPH McORLLY



J. W. BAILEY

two additional vice presidents and a new chief engineer.

Joseph McOrlly has been elected vice president in charge of engineering. Lester D. Drugmand has been named his successor as chief engineer.

John W. Bailey has been elected vice president in charge of industrial relations.

McOrlly joined the company in

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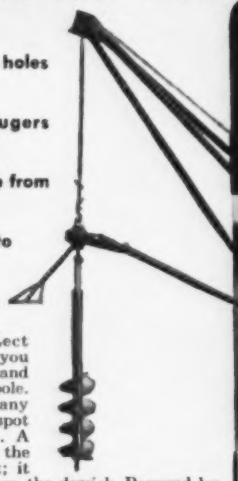

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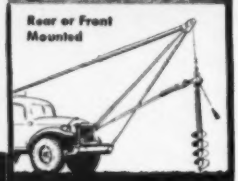

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1935 as an electrical engineer and he has been serving as chief engineer since 1940. Prior to coming to Wiegand, he was associated with industrial and power companies as an electrical engineer.

Bailey has been personnel director since 1944. His entire business career has been devoted to personnel work. Drugmand started with the company in 1948 as assistant chief engineer. Before joining Wiegand, he was an industrial development and research engineer.

Louis Krieger Advanced by Central Maine Power

Louis J. Krieger has been appointed operating engineer of Central Maine Power Co. Krieger, who has been assistant operating engineer since 1941, will make his headquarters at Augusta.

Fred W. Eaton, for many years operating engineer of Central Maine, has been assigned to the new post of manager of the utility's station and transmission department.

The new operating engineer started with the company in 1930 and has served in operating capacities at several of Central Maine Power's generating plants. In 1934 he was transferred to the general offices and engaged in operating engineering.

Eaton, whose headquarters will continue at Augusta, is widely known in the industry. Under him notable progress has been made in the coordination of steam and hydroelectric plant operation during recent years of system expansion in the field of station and transmission service.

H. K. Schnetter has been appointed administrative assistant to the manager of the eastern district of the Westinghouse Electric Corp's Lamp Division. **C. N. Neumann** has been named sales promotion representative. Schnetter, formerly office methods coordinator for the Lamp Division plant at Bloomfield, N. J., started with Westinghouse in 1942. Neumann has been associated with Union Carbide & Carbon Co since 1949.

W. D. McCully, an engineer associated with Detroit Edison Co for 24 years has been placed in charge of the utility construction department of the R. H. McManus & Co, Detroit, Mich., and its affiliate concern, Mc-

Manus & McCarthy, Inc, Cincinnati, Ohio. McCully's last project with Edison was as its representative on the construction of the 8 in. cable line which ties up the utilities power substations. The McManus companies specialize in various types of utility company construction.

OBITUARY

Oliver Lyford

Oliver S. Lyford, 81, electrical engineer and consultant to power companies and industrial concerns, died at Daytona Beach, Fla., March 5.

Lyford served as a chief engineer with Westinghouse Electric Corp from 1897 to 1899. He then became vice president and general manager of Siemens & Halske Electrical Co, remaining until 1901. As consulting engineer to Westinghouse, Church, Kerr & Co from 1901 to 1912, he assisted in the construction and electrification of Pennsylvania Station and tunnels under the Hudson River, New York. He was also with the Lawrence Park Heat, Light & Power Co, Northern Colorado Power Co, Utah Power Co, and New England Westinghouse Co.

He was one of the founders of the National Industrial Conference Board.

Gaskell S. Jacobs, 63, who served as comptroller, treasurer, and vice president of Hawaiian Electric Co from 1938 to 1947, died Feb. 22 at San Francisco, Calif. Earlier in his career he was associated with Buckner Speed, consulting engineer, Berkeley; Peoples Water Co, Oakland; and J. G. White Co, engineering firm, San Francisco, all of California. At the time of his death he was a consulting engineer.

Charles A. Miller, 58, an electrical engineer with the Sao Paulo (Brazil) Lighting Co for the last six years, died in New York March 8. Before joining the Sao Paulo company, he had been with American Gas & Electric Co for 20 years.

Albert Garey Towers, 78, former chairman of the Maryland Public Service Commission, died Feb. 28. Towers joined the commission in 1913 and was elected its chairman in 1914. He remained in this post until 1919.

Carl E. Hamby, 65, Cobb County (Ga.) manager of the Rural Electrification Administration, died Feb. 27.

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INDUSTRIAL APPLICATION of television is shown at the Radio Engineering Show held recently in New York. Here traffic control of a modern railroad yard by TV is demonstrated with new industrial camera chain. The camera beams on a miniature railroad yard

TV Covers Railroad Traffic

An exhibit featuring the control of a modern yard's activities was sponsored by Du Mont at IRE show

Complete traffic control of a modern railroad yard by means of television was demonstrated in an exhibit at the Radio Engineering Show held recently at Grand Central Palace, New York. The show was given in conjunction with the 1952 national convention of the Institute of Radio Engineers at the Waldorf-Astoria Hotel.

Featured in the demonstration was a new industrial camera chain developed by Allen B. Du Mont Laboratories, Inc, for industrial TV applications. The television unit, which was shown to the public for the first time, was set up to simulate a camera chain in a switching tower of an actual railroad yard.

Automatic loading and coupling of the trains, operations of the switches and other activities in the yard were observed by the spectators on the camera chains' two monitoring screens just as they would be seen in the office of a yard manager or other railroad office under actual operating conditions.

The new camera chain is outstanding because of its small size. It is composed of three basic units: (1) a camera, (2) a control-monitor unit, and (3) a power supply. Additional remote picture indicator units may be added to the basic system.

Among the other exhibits was a new television transmitting tube, which is expected to find widespread use in the expansion of ultra-high-frequency television. It was displayed for the first time by General Electric Co's Tube Department.

Significant aspect of the new tube is the use of a forced-air cooling system to control heat generated as the tube operates at its peak output of 1 kw. Previous tubes have used a water-cooling system. In the air-cooling operation, air is forced through the tube's radiator fins at the rate of 1 cu ft per sec.

The transistor, a germanium crystal which will amplify an alternating current, including radio waves, was also on exhibit.

Developed by the Army Signal Corps, the transistor is a miniature "converter" used instead of vacuum tubes with radio-teletype-writer equipment to change radio impulses to the kind of electrical current required to actuate a teleprinter. The transistorized converter, which weighs only 10 lb compared with about 100 lb for comparable equipment now in service, requires only about one-hundredth part of the current needed for equipment now in use.

General Radio Co had on display these instruments: (1) a pocket type sound survey meter for preliminary estimate of noise levels, (2) sound level meter for detailed noise surveys, and (3) an octave band noise analyzer for determining industrial noise levels damaging to the ear. The three comprise a line of instruments which can be used for noise studies.

Zinc Purchase Accord to Increase U. S. Output

U. S. output of slab zinc will be increased by 9,250 tons a year as the result of a recent purchase agreement reached between Defense Materials Procurement Administration and American Smelting & Refining Co, New York.

The agreement calls for American Smelting to build a $1,719,000 concentrating facility at its Van Stone mine property in Steven County, Wash. The concentrator will have a capacity of 1,000 tons a day.

To fulfill its part of the bargain, DMPA has agreed to buy up to 18,500 tons of slab zinc produced by the new facility, provided the company cannot sell it to other U. S. buyers at a higher price. DMPA will pay 15½¢ a lb f.o.b. East St. Louis, Ill. The present ceiling price is 19½¢ a lb, East St. Louis.

The agreement will terminate three years after the company gets its facilities into operation or when 18,500 tons of slab zinc have been produced, which ever occurs sooner. The concentrator is scheduled to go into operation this September. DMPA said the plant will also produce about 850 tons of pig lead annually.

USBR Awards Contract to English Electric Co

Bureau of Reclamation, with the approval of Interior Department, has awarded another contract for heavy electrical equipment to a foreign firm, English Electric Co. The equipment is to be used for the Folsom power plant switchyard on the Central Valley Project in California.

English Electric won the contract for an 80,000-kva autotransformer

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for the Folsom plant with an evaluated bid of $302,912.50 and agreed to deliver the transformer in 730 days. English Electric's bid includes a 25% differential in compliance with the 1933 "Buy American" Act and a 12½% import duty.

Second low evaluated bidder was Ferranti Electric Co, New York, who would manufacture the equipment abroad. Ferranti, however, did not offer delivery in accordance with the specified time schedule of 730 days.

Westinghouse Electric Co was the third evaluated bidder with a bid of $331,410.57 but stated it would require 917 days before it could ship the equipment.

MANUFACTURING BRIEFS

Total primary aluminum production in the United States during January totaled 153,867,619 lb, the Aluminum Association has reported. The January figure represents a gain of 6.2% over the December, 1951, total of 144,907,819 lb and a 13.2% gain over the January, 1951, figure.

Thompson Chemicals Corp is the new name of Thompson Horticultural Chemicals Corp, St. Louis, Mo. No other changes, however, have been made in the corporate structure, management, personnel, or policies.

SALES ASSIGNMENTS

COMPANY STAFFS

Davey Compressor Co has appointed A. H. Knief regional manager with headquarters in Milwaukee. Knief, who was formerly affiliated as a sales representative with Wisconsin Motor Corp, will be in charge of sales in Wisconsin, upper Michigan, Minnesota, Iowa, Illinois, and Missouri.

General Electric Co has appointed Walter J. Fitzpatrick central regional sales manager for GE replacement tubes. Fitzpatrick, who has been district representative for replacement tubes and parts at the Los Angeles office, will make his headquarters in Chicago.

BullDog Electric Products Co, Detroit, Mich., has appointed Byron O. Beckley Cleveland district manager. Beckley, who has been associated with BullDog and its Cleveland office for ten years, replaces Harry Leavell, who has retired. F. R. Snider of the Columbus office has been assigned the Pittsburgh territory replacing John Audet, who also has retired. D. E. Aberdeen has been added to the Chicago sales force and R. B. Culbreth has been assigned to the Atlanta, Ga., office.

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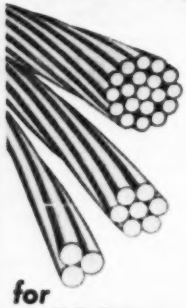

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New Electrical Construction

New electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included.

UTILITIES

Proposed Construction

California—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Herdlyn and Bethany, one main control board extension, transfer breaker, distance relays, metering equipment for P. G. & E. Company lines Nos. 1 and No. 2, for Tracy Switchyard, Central Valley Proj., Spec. DS 3686. L. N. McClellan, ch. engr.

Colorado — Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver, Federal Center, Denver, furnishing, del. f.o.b. cars shipping point or f.o.b. cars Loveland, controlling station supervisory control and telemetering switchboard cubicle and equip. for Flatiron Power Plant for controlling and telemetering the Flatiron afterbay dam and Rattlesnake Dam; controlled-station supervisory control and telemetering equip. for Flatiron afterbay dam for operation from Flatiron Power Plant and telemetering and recording equip. for Rattlesnake Dam, Colorado-Big Thompson Proj., Spec. DS 3687. L. N. McClellan, ch. engr.

Colorado — Bureau Reclamation, Dpt. Interior, Casper, Wyo., constructing Julesburg Sub-station, Missouri River Basin Proj., Spec. 703C-238. L. N. McClellan, Bldg. 1A, Denver Federal Center, Denver, engr.

Colo., Boulder—U. S. Atomic Energy Comn., P. O. Box 5400, Albuquerque 2, N. M., 2 electrical sub-stations, incl. excav. approx. 5,000 cu. yd. earth, grading, fencing rein.-con. foundation, placing conduit and installing grounding system and placing assembly and connecting two metal-clad unit-type 5000-6250 kva substations, at Rocky Flats Proj. Austin Co., 1300 Glenarm Pl., Denver, Colo., archt. and engr.

Fla., Jacksonville—City, City Hall complete switching gear and installation for Hendricks Ave. Sub-station on southside; Spec. 1063.

Miss., Biloxi—U. S. Eng., P. O. Box 1169 2301 Grant St., Mobile 7, Ala., extensions, revision electrical distr. svs., Keesler Air Force Base, Eng. 01-076-52-3. Plans deposit $20.

Montana — Bonneville Power Admin., 827 N. E. Oregon St., Portland, Ore., Inv. 6342, Anaconda sub-station. Plans deposit $25. L. C. Stewart, c/o owner, engr.

Montana — Bonneville Power Admin., 827 N.E. Oregon St., Portland, Ore., Inv. 6346, Hot Springs sub-station. Plans deposit $25. L. C. Stewart, c/o owner, engr.

Montana—Bonneville Power Admin., 827 N.E. Oregon St., Portland, Ore., Inv. 6349, Anaconda control house and oil-pump house. Plans deposit $25. L. C. Stewart, co owner, engr.

N. Y., Rome—U. S. Eng., 80 Lafayette St., New York. Zone 13, electronic test facilities at Griffis Air Force Base, $818,000.

Oregon—Bonneville Power Admin., 827 N.E. Oregon St., Portland, Inv. 6361, clear 42.3 mi. right of way Detroit-Albany 230-kv transmission line, Linn Co. Plans deposit $1.

Oregon—Bonneville Power Admin., 827 N.E. Oregon St., Portland, construct Boyer sub-station, Polk Co., Inv. 6340. Plans deposit $25.

Pa., Phila.—Dpt. Navy, Pub. Wks. Dpt., Phila. Naval Base, power plant imprvs. at Naval Shipyard. $925,000.

Texas—Caprock Rural Telephone Cooperative, Spur, 550 mi. pole telephone distr. lines, Dickens Co. $500,000. H. N. Roberts & Assoc., 1310 Avenue Q, Lubbock, engrs.

Tex., Big Spring—U. S. Eng., 1127 Texas & Pacific Bldg., Fort Worth, utilities at Air Force Base, incl. electric distr., walks, roads, aprons and drainage, etc.

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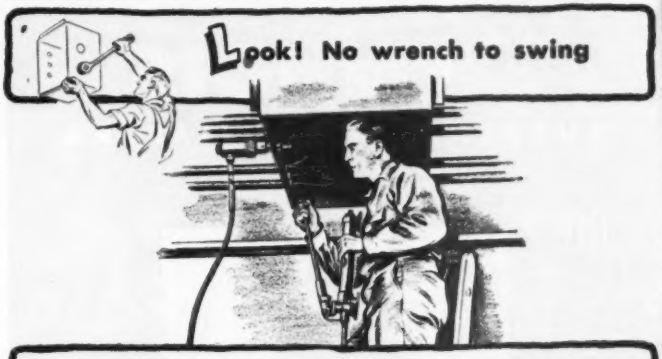

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Hutier, Brasher, Pucket & French Assoc., Big Spring, engrs.

Utah, Salt Lake City—Kennecott Copper Co., Kearns Bldg., plans by Ashton, Evans & Brazier, 26 West S. Temple St., construct Mines Research Laboratory on the University of Utah Campus, etc. $1,250,000.

Washington—Bonneville Power Admin., 827 N.E. Oregon St., Portland, Ore., construct Raymond sub-station, Pacific Co., inv. 6344. Plans deposit $25.

Wyoming—Bureau Reclamation, Dpt. Interior, Casper, constructing of Guernsey Tap-Guernsey 115-kilovolt transmission line, Missouri River Basin Proj., near Guernsey, Spec. DC-3690.

Alaska—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo. furnishing, del. f.o.b. cars shipping point or f.o.b. cars Eklunta, 2 oil-pressure, cabinet, vertical-gate-shaft-type governors for regulating the speed of 2 25,000-h.p. 600-r.p.m. vertical-shaft hydraulic turbines for Eklunta Power Plant, Eklunta Proj. Inv. No. DS-3688.

N. B., St. Stephen—Bd. of Trustees Charlotte County, Hospital, S. D. Grandville, treas., plans by Govan, Ferguson, Lindsay, Kaminker, Maw, Langley & Keenleyside, 515 Jarvis St., Toronto, Ont., concrete frame, brick, power house at hospital, $150,000.

Low Bidders & Contracts Awarded

Georgia—Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, Pa., CA, $2,276,512, furnishing, installing two 44,444 kva and one 6,667 kva generators for powerhouse of Buford Dam, Buford. U. S. Eng., P.O. Box 1169, Mobile, 7, Ala.

Mich., Kinross—C. A. Hooper Co., 453 W. Gilman St., Madison 3, Wis. CA $750,598, power plant, steam distr. sys., Eng. 2-064-52-38. CD 2/14 under LB, Kinross Air Force Auxiliary Field. U. S. Eng., 1900 Cadillac Tower, Detroit 26, Mich.

Oregon—Ferranti, Ltd., Hollingswood, Lancashire, England, LB $1,055,300, nine 56,500 kva transformers for McNary Dam, CIVENG 45-164-52-62. U. S. Eng., city-county Airport, Walla Walla, Wash. Bids March 6.

Tennessee—Pioneer Constr. Co., 1300 Oak St., Chattanooga, Tenn. LB $154,955, telephone lines. Powell Station, Powell Telephone Co., Powel Station, Tenn. Bids Feb. 26.

Utah, Magna—Utah Copper Div., Kennecott Copper Corp., Kearns Bldg., Salt Lake City, Utah. Own Forces. $500,000, electrical modernization of Magna Mill, incl. installation new primary sub-station, 14 new secondary sub-stations, new primary distr. sys., and new secondary distr. sys. R. J. Corfield, c/o owner, ch. electrical engr.

Wash., Spokane—Northwest Eng. Elec. Co., 3715 Western Ave. Seattle, Wash., LB, $154,388, est. $220,935, electrical distr. sys. at stub parking areas, Fairchild Air Force Base, Inv. 52-21. U. S. Eng., City-County Airport, Walla Walla, Wash. Bids Mar. 5.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Fla., Foley—Buckeye Cellulose Corp., c/o Procter & Gamble Co., 155 E. 44 St., New York, N. Y. pulp plant, $20,000,000.

Ill., Chicago—Michael Reese Hospital, 29 and Ellis Ave., plans by Loebl, Schlossman & Bennett, 430 N. Michigan Ave., Zone 11, two addns. to hospital, $3,585,000.

Ind., Hammond—School City of Hammond, 5935 Hohman St., plans by L. Cosby Bernard & Co., 7241 Forest St., Technical and Vocational High School, $2,000,000. Leo Besozzi, 5217 Hohman St., consult. engr.

Mich., Detroit—Detroit Aviation Comn., 11201 Conner St., city airport on 1,400 acres, suburb on location Oakland-Macomb city line. John R. Ryan and 13 mile Rds. $15,000,000.

Tenn., Columbia—Union Carbide & Carbon Corp., Columbia, plant addns. $2,500,000.

Utah, Huntsville—Abbey of Our Lady of the Holy Trinity, Rt. Rev. Mauritius M. Lans, Abbot, c/o Ashton, Evans & Brazier, archts., 26 W. S. Temple St., Salt Lake City, construct Cistercian Monastery near here, $12,000,000.

W. Va., Kingwood—County Court of Kingwood, Kingwood, plans by L. D. Schmidt & Son, 309 Cleveland Ave., Fairmont, 3 story, bsmnt., steel frame, brick, concrete hospital, $1,250,000.

2-WAY RADIO SYSTEM TRIPLES EFFICIENCY OF MAINTENANCE TRUCKS

San Diego Gas & Electric Expansion Plans Will Put G-E Mobile Communication in More Service Vehicles

FAST-GROWING cities like San Diego, whose population has mushroomed 65% in 10 years, make heavy demands on utility equipment. Communications Supervisor L. J. Tank of the San Diego Gas & Electric Company describes his solution this way:

"**At the present time** 53 of our vehicles are equipped with G-E mobile radio. Our records show they are almost 3 times as efficient as our utility trucks that are not radio-equipped. Because these G-E units have paid off for us, our expansion plans call for more of the same."

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Central office communication system is tied in to mobile net. In 5 years peak load of this utility has jumped from 177,000 kw to 305,500 kw. The company now serves 198,000 customers, is still expanding facilities.

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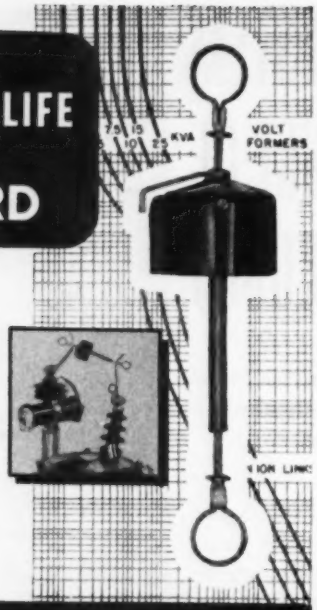

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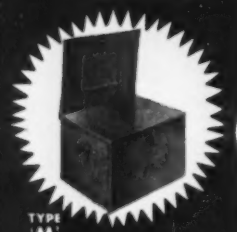

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BOOK REVIEWS

Lighting Handbook

IES Lighting Handbook. Published by the Illuminating Engineering Society, New York 23. 987 pages, illustrated. Price $8.00.

This is a second edition. It retains the comprehensive content of the first edition and incorporates the newest developments in lighting techniques, application and theory. This practical presentation is useful to architects, building engineers, consulting and utility company lighting engineers as well as lighting equipment manufacturers and designers. A 37-page appendix includes tables and calculations for conversion factors for lighting units, glare factors, and many other important data. It contains a 24-page index, cross-indexed for easy reference.

Wiring Code Handbook

National Electrical Code Handbook. By Arthur L. Abbott. Published by McGraw-Hill Book Co, New York 36. 652 pages, illustrated. Price $6.00.

In this revised seventh edition is retained the comprehensive content of the sixth (1947) edited to include all changes, new rules, etc. given in the 1951 National Electrical Code. A key on the front cover and flyleaf aids quick reference use by busy, practical men or anyone wishing to make a thorough study of the Code. It includes descriptions of each of 15 types of wiring recognized by the Code for use in light and power wiring systems and rules for installation of the commonly-used materials and apparatus for any standard wiring installation.

Control

Theory of Control in Mechanical Engineering. By R. H. MacMillan. Published by Cambridge University Press, New York. 195 pages. Price $6.00.

This explains the principles that underlie the action of automatic controls, servomechanisms and regulators. For engineers and scientists who need to use automatic equipment and have a full understanding of its operation and limitations necessary for its proper treatment and best possible service. It contains an extensive bibliography and a number of examples for students, including some questions set in recent examination papers.

Electronics

Industrial Electronics. By Andrew W. Kramer. Published by Pitman Publishing Corp. New York 19. 311 pages, illustrated. Price $6.00.

This book explains the fundamental principles of electronics without using mathematics and shows how their principles are applied in industry. For the practical man in the industrial plant who wants to know how the new methods and equipment of electronics can be used for improving maintenance and operations. It offers valuable information for anyone interested in various uses of electronics.

Alternating Current Machines

Alternating Current Machines. By George V. Mueller. Published by McGraw-Hill Book Co, New York 36, N. Y. 502 pages, illustrated. Price $7.50.

Textbook for senior electrical engineering students. Standard methods of machinery circuit analysis and current and voltage diagrams are used throughout. Explanations through use of oscillograms and other devices are clear and effective. The text appears to be highly satisfactory for the course for which it was designed.

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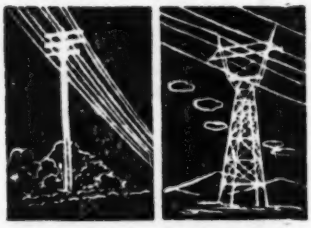
On Steel Tower and Wood Pole Lines



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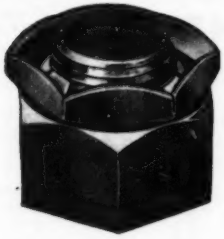

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CATALOGS • BULLETINS

● INDUSTRIAL FURNACES: A 28-page booklet, B-5459, by Westinghouse tells how to match a furnace to your particular heat-treating problem. Entitled "Harnessing Heat", it describes twelve different types of furnaces, both gas and electric, and briefly outlines their chief field of application. Write Westinghouse Corp., Box 2099, Pittsburgh 30, Pa.

● WATER BOOSTERS: A four-page folder recently released describes the Waage electric hot-water booster. This booster is used for raising the temperature of reuse water for dish washers, etc. The booster consists of a brass storage tank, copper-sheathed immersion heaters and an automatic temperature control. Waage Electric, Inc, Kenilworth, N. J.

● WELDROD AND MINE CHART: A wall chart listing all of the Ampco bronze weldrod and wire products by trade name together with AWS-ASTM designation has just been released. Opposite trade names, descriptive data, applications, mechanical properties, etc. are included. Write Ampco Metal, Inc, 1745 So 38 St, Milwaukee 46, Wisc.

● RADIOMATIC PYROMETERS: The Brown line of Radiomatic pyrometers is completely described in the new 28-page catalog 9300. Included are sections on operation, theory, constructional features, engineering specifications, applications, and also photos and line drawings. Minneapolis-Honeywell Regulator Co, Wayne and Windrim Aves, Philadelphia 44, Pa.

● MOTORS: Construction details of Allis-Chalmers totally-enclosed fan-cooled motor (Type APZ) are described in a new bulletin released by the the company. Also included in Bulletin 51B7225 are ratings and dimensions of these type motors. Allis-Chalmers Mfg Co, 932 So 70 St, Milwaukee, Wisc.

● WELDING: "How To Design for Nelwelding" is a concise 8-pg manual prepared to aid designers and production engineers in the fast, economical solution of fastening problems. Stud specifications and stud selection guides, detailed suggestions concerning template design, and provisions for accommodating fillet are presented. Write Nelson Stud Welding Div, Gregory Industries, Inc, Lorain, Ohio.

● INDUCTION HEATING: A new 12 page, two color bulletin, GEA-5679, describes GE equipment for induction heating. The booklet describes forging, hardening, brazing, and annealing applications at 1000, 3000, and 10,000 cycles. The components and requirements of induction heating with motor-generator sets are explained. General Electric Co, Schenectady 5, N. Y.

● COPYFLEX: A new booklet describing the Bruning Copyflex Model 20 has been released recently. The machine is particularly adopted for low-cost copying in business and industry. Specifications for the copyflex are included. Write Charles Bruning Co, Inc, 100 Reade St, New York 13, N. Y.

● COAL HANDLING EQUIPMENT: A new 44-page booklet, No. 2410, on coal and ash handling equipment for power plants has been published by Link Belt Co. The book contains layouts and photos of actual installations. It has sections devoted to unloading coal, auxiliary unloading, coal storage and reclaiming, crushers, transporting and distributing equipment, and ash handling. Link Belt Co, 307 No Michigan Ave, Chicago 1, Ill.

● POWER SUPPLIES: The Model 600, multiple power supplies are described in a new bulletin. Features of the units and specifications are presented. Write to the Bristol Engineering Corp, Lincoln Ave and Pond St, Bristol, Pa.

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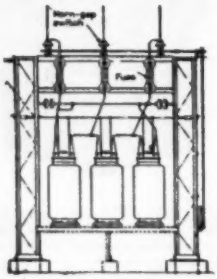

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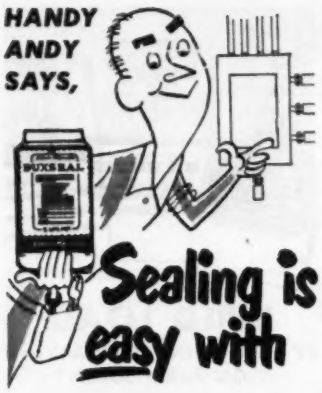

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TECHNICAL LITERATURE

Measurement and Control—*The Handbook of Measurement and Control* has recently been prepared by the Instruments Publishing Co, Inc, Pittsburgh. The book is a text in itself and is extremely condensed. Some of the topics covered are thermometry, pyrometery, temperature control, flow rate, electrical instruments and regulators, etc. Priced at $4, book is available to subscribers of Instruments.

Luminescence—*A Survey of the Theoretical Aspects of the Luminescence of Inorganic Crystalline Solids*, a Naval Research Laboratory report, provides an extensive theoretical background based on the various existing theories as they apply to individual systems of luminescence. These theories reveal how luminescence problems have been treated generally and may be used as a guide in understanding the processes involved. Publication PB102597 available for $1.00 from Office of Technical Services, US Dept of Commerce, Washington 25, D. C.

Wiring Estimator—*Home Wiring Estimator* that includes essential data in planning wiring systems has been prepared by Westinghouse. Work sheets are laid out in a functional step-by-step manner. Provisions have been made for general wiring, general purpose, small appliance, and major appliances that require special wiring considerations. For a copy of booklet SA-6815, send 25¢ to Better Home Bureau, Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Gas Engines—*The Modern Gas Engine*, is a paper providing data, photographs and charts on the development of the large internal combustion engines used for pipe line transmission service and electric power generation. Installation and operating economies of different types of design on their various services. Write the Cooper-Bessemer Corp, Mount Vernon, Ohio.

Instrument Servomechanisms—A 265-page book, *Instrument Servomechanisms*, describes servomechanisms used for automatic positioning. Other common types of servomechanisms such as used for automatic flow control in industrial processing plants are omitted. A valuable feature of the text is that the behavior of servo systems is explained by analogy with the actions in electronic circuits. It is presented in language which is familiar to electronic personnel. Available at $2.00 from Office of Technical Services, US Dept of Commerce, Washington 25, D. C.

Copper Alloys—*Machining Copper Alloys* is the title of a new 32-page booklet suggesting cutting speeds, feeds, tool rakes and clearances used on more than 40 different copper alloys. Also included are tables showing compositions, physical constants and properties on copper, brass, bronze free cutting, general purpose and engineering rods, weight tables and conversion factors. Ask for Publication B-3. The American Brass Co, Waterbury, Conn.

Electrodes and Welding Alloys—A *1952 Directory* of electrodes and welding alloys has been issued containing photos, data and technical information on a series of Eutectic low temperature welding alloys for use on cast iron, steel, alloy steels, copper, brass, bronze and others. In addition, bonding temperatures and tensile strengths of over 100 different welding alloys are included. Write Eutectic Welding Alloys Corp, 172 St and Northern Blvd, Flushing 58, N. Y.

Insulation Tester—The new General Radio Megohmmeter is described in the November 1951 issue of the General Radio Experimenter. Features, operating data,

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Copper Alloy Rods—This 24-page publication, B-14, includes physical constants and properties on 46 free cutting and general purpose rods. Also featured are convenient weight tables, conversion factors and a ready-reference chart for balancing material costs against production costs. The American Brass Co, Waterbury 20, Conn.

Metals and Alloy Identification—International Nickel has recently issued a 48-page booklet entitled *Rapid Identification of Some Metals and Alloys*. Mentioned in the booklet are copper, aluminum, silver, stainless steel, lead and numerous other ferrous and non-ferrous metals and alloys. Reagents are listed for the spot checks. Write International Nickel Co, Inc, New York 5, N. Y.

Transformer Design Index—A cross-index of the more than 50,000 transformer designs has been prepared. It will cover virtually the entire field of filters, chokes and transformers and should be a great time saver for engineers. Write Thordarson Meissner Mfg Div, Mt Carmel, Ill.

Bridging Amplifier—A special test instrument, the Model 102 bridging amplifier, is described in a new 4-page bulletin. It is used to increase the accuracy of vacuum tube voltmeters and oscilloscopes on high impedance circuits. Bulletin lists complete specifications including diagrams of typical applications. Write to Keithley Instruments, 3868 Carnegie Ave, Cleveland 15, Ohio.

Wood Preserving—The completely revised manual of the *AWPA Manual of Recommended Practice* has been released. The manual contains all information relating to preservatives, treatment of commodities, and analysis methods used in the impregnation of wood for protection against fungi, insects, marine borers and other destructive agencies. Available from American Wood-Preservers Assoc, 839 Seventeenth St, Northwest, Washington 6, D. C.

Standards for One Line Diagrams—The *American Standard Graphical Symbols for Single Line Electrical Engineering Diagrams*, Z32.1.1-1951 has been approved by the ASA. For the first time single-line diagrams for use in both power and communication work are combined and contained in one volume. The diagrams show the function of a part rather than a picture of it. Copies available at $1.40 each from the American Standards Assoc, 70 E 45 St, New York 17, N. Y.

Tube Life—The many factors affecting tube life in high-pressure, high-temperature applications are presented in a new 40-page illustrated booklet published recently. The booklet, TR516, presents the results of a great number of investigations of failures of carbon steel, intermediate chromium-molybdenum alloy steel and stainless steel tubing in boilers, cracking stills, heaters and heat exchangers during service at elevated temperatures and pressures in the power, oil and chemical processing fields. Write Tubular Products Div, the Babcock and Wilcox Co, Beaver Falls, Pa.

Screw Thread Gages—A revised edition of the *American Standard for Screw Thread Gages and Gaging* has just been approved by the ASA. This edition brings up-to-date the methods for checking threaded products to see if they comply with the requirements of the Unified Threads Standard approved in 1949 by Great Britain, Canada and the United States. Available at $4.00 a copy from the American Standards Assoc, 70 E 45 St, New York 17, or from ASME, 29 W 39 St, New York, N. Y.

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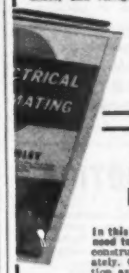

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3 ph. 60 cy.

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1—	1500	G.E.	360	275	2200/4400
1—	1000	G.E.	900	200	4100/6900
1—	1500	G.E.	600	600	2300 4150
2—	1000	Whse.	900	600	2300/4150
1—	500	Whse.	900	250	6600/12000
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
1—	350	G.E.	900	125	4150
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300

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1—1250	Whse.	OI8C	3	13200x2525
3—1250	G.E.	BVDDJ	1	6600x2580
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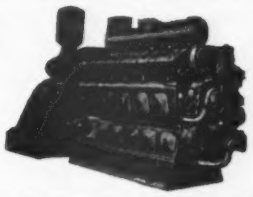

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937.5	General Motors	12-567	1080	720	312	Clark	MD-4	375	327
625	Alco	6-12½x13T	750	600	125	Ingersoll Rand	S	225	514
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2— 100 KVA Newark, 440V 3 Ph., 220V 2 Ph.
1— 50 KVA G.E., 1 Ph., 13,450V, 120/240 Sec.
2— 25 KVA G.E., 1 Ph., 11,500V pri., 230/460V sec.
3— 25 KVA G.E., 1 ph. 560V. pri., 110/220 sec.

SYNCHRONOUS MOTORS

1— 300 H.P., Elec. Mach. 720 RPM. 3 Phase 60 cyc., 2200V. Totally Enclosed Fan Cooled Outdoor service.

MOTOR GENERATOR SETS

1—1000 KW G.E., 600 V. 514 RPM, 4000V Syn.
1— 200—KW Whse., 275V. 900 R.P.M., 220 V Syn.
1— 175 KVA West., 1 Ph., 220V, Motor 3 Ph., 440V.
1— 150 KW G.E., 125/250V, 1200 RPM, 2300 Syn.
1— 100 KW G.E., 250V, 900 RPM, 2300V, Syn.
1— 75 KW Cr Wh, 250V, 1200 RPM, 2300/3150V Syn.

SLIP RING MOTORS

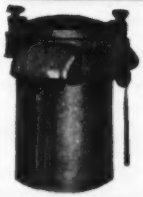
1—2500 HP G.E., MT. 257 RPM 6600V.
1— 250 HP West., CW. 600 RPM, 440V.

SYNCHRONOUS CONDENSER

1—2500 KVA Whse., 720 RPM, 2200V with DC EXC.

Large Stock of A.C. and D.C. Equipment

—TRANSFORMERS—



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LETTERS TO THE EDITOR

Foreign Goods for U. S.

To the Editor:

The article on pages 67 and 68 of Electrical World, Feb 25, discusses some recent projects for power plant equipment on which bids on foreign-built machinery were received from British and Swiss firms. The article also mentions another case involving our company in which the award of the contract for Swiss equipment was recommended.

Based on these few isolated cases, mostly unsuccessful attempts, a number of general conclusions are drawn and also repeated and supported in your editorial on page 61. There is not the slightest justification for these conclusions based on the factual evidence presented or even derived from basic economic reasoning.

The table of relative export and import figures in various classes of generating and transmitting equipment during the last few years constitutes the most eloquent rebuttal for the conclusions of this article. The argument that imports varying from less than 0.1% to slightly over 2% of the exports constitute a "serious threat" to the domestic industry or will "weaken" it to such an extent that it may need to be "reestablished" in times of emergency borders on the ridiculous.

The argument becomes even more peculiar and unrealistic when it is considered that the total export volume of the power equipment industry is probably around 5% of its total yearly billings. In this light the import figures become almost infinitesimal and certainly negligible.

Presumably NEMA is well aware of these facts. It is, therefore, very difficult to understand how this distinguished organization elected to take such a stand. If imports of a fraction of 1%, or even a few percent, were actually a serious threat to an industry, then something would be radically wrong with that industry. However, as everyone knows, the American power equipment industry is enjoying excellent health and continued growth and prosperity.

The statement on recent tariff reductions in your article is intended to imply that here again "something was given away." In all fairness it should be stated that these tariff reductions were given in return for valuable concessions by other countries which have increased U. S. exports to such countries in many lines of goods.

In regard to the present situation you stated that "the volume of business that may go to foreign manufacturers may very well be small" or that "foreign firms have not been getting all of the contracts for which they have been bidding." Nobody active in the power plant equipment business can get more than a small share of the contracts on which he is bidding, least of all the foreign manufacturers.

As to the potential threat of such imports in the future, even if all the power equipment firms of Western Europe were foolish enough to try, or were even physically able, to throw their entire yearly production into the United States, the total amount could not be more than about $300-400 million. This compares with a total yearly production of $2-3 billion for the domestic industry. Let me emphasize that this is all hypothetical. It can be presumed that the major European manufacturing firms have a sufficiently well-developed sense of reasoning and practical economics not to waste time chasing after such Utopian dreams.

To answer protests made by the United Steelworkers of America, the "Economic Outlook," Feb 1949, page 13, published by the CIO's Department of Education and Research, reported as follows:

"Import competition helps to control monopolies, helps to keep domestic prices at competitive levels, and helps to keep our economy healthy. Reciprocal trade agreements, by lowering our tariffs, encourage import competition.

"If we expect to export to their countries we must expand our imports from them . . . Europe cannot buy our products unless the United States and other countries buy from them."

A study of trade between the United States and Switzerland during the last six years reveals these totals:

	Value
Swiss imports	$1,139 million
U. S. imports	$ 665 million

Specific figures for our company show exactly the same pattern. The general sales policy of our Swiss parent company is, and has been consistently for over 60 years, to establish and maintain friendly relations with customers in every country of the world as far as political facts permit. We have no plan or intention to ruin or damage the power equipment industry in any country. We do resent unfounded propaganda and insinuations that there are improper or sinister motives behind our activities.

In light of all this, the recent protest actions of NEMA and others can be classified only as "much ado about nothing." Perhaps we should recognize that NEMA is not quite unbiased in this matter. Nevertheless, it is highly regrettable that your periodical, with its high standard of integrity and its tradition of factual reporting, let itself be persuaded to take a stand against the best interests of this country's economy and in direct contradiction to well known and easily ascertainable basic facts.

Paul R. Sidler
President
Brown Boveri Corporation
New York 6, N. Y.

To the Editor:

I feel I must comment on your editorial "We Need a New U. S. Policy" which appeared in Electrical World, Feb. 25, 1952, page 61.

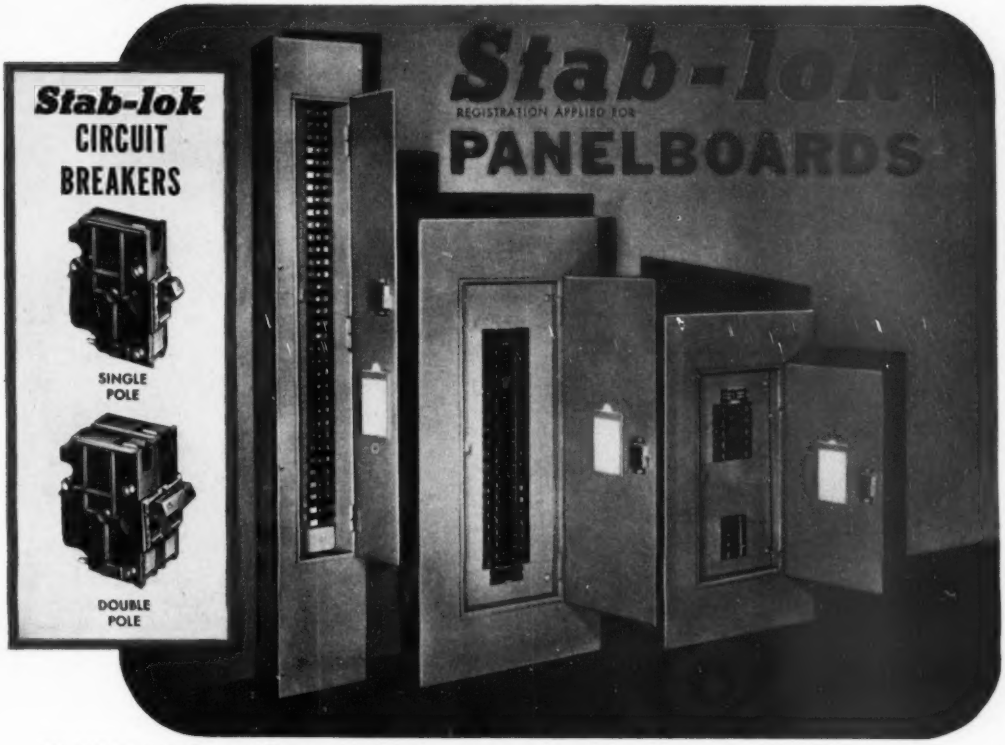
The basic condition for a financially stable world and consequently a prospering United States is a balance of foreign trade. This requires a minimum of import and export duties and the right of any nation to buy and sell where ever it is able to compete profitably.

How much better it would be to distribute American dollars about the world as payment for useful goods than as "loans." How can we expect foreign countries to prosper if we refuse to trade with them on one hand and on the other say, "Why don't you help yourself?"

It is incomprehensible to me that a country as large as ours must "protect" its industry with excessive trade duties. If our superior know-how and modern methods can't compete with "cheap" foreign labor, then let us move to a field where we can compete. Everyone would then benefit since we would get the product cheaper and the foreign country would have dollars to use on the world market.

Kenneth E. Russell
1138 High Bridge Road
Schenectady, N. Y.

WHY WAIT? IN MINUTES, YOU CAN ASSEMBLE



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ONE MAN INSTALLATION: Trim hangs on a support bracket, leaving workman's hands free. Holes always line up.

REMOVABLE INTERIORS: Simply lift the interior from the box. To replace you merely hang on support bracket.

AUTOMATIC ALIGNMENT: If box is installed at an angle, merely shift trim front. Springs give positive, automatic plaster alignment, too.

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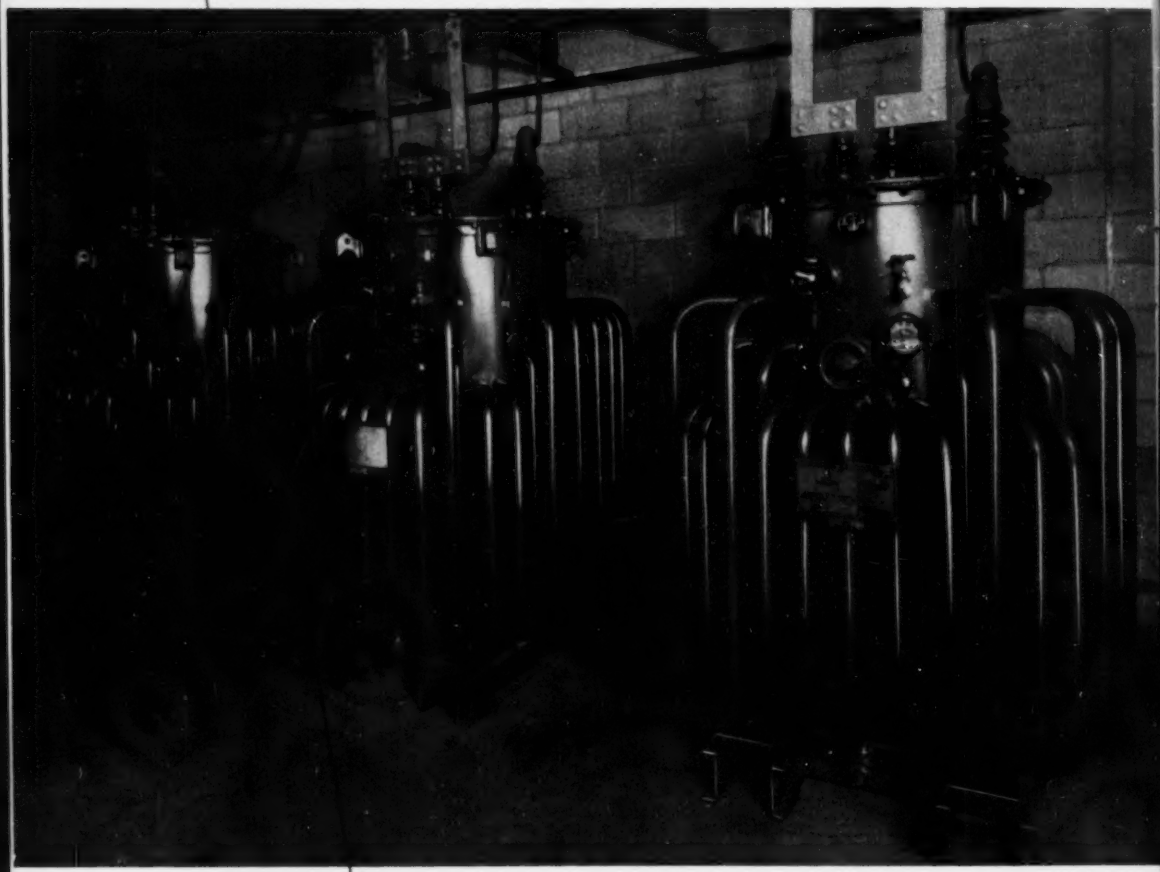

Three banks of Kuhlman Saf-T-Kuhl Transformers, like the one shown here, are contributing their share of work in ethical pharmaceutical production at Smith, Kline and French Laboratories of Philadelphia. This firm, one of the country's leading pharmaceutical manufacturers, uses Saf-T-Kuhls chiefly because of their safety and convenience of installation. Saf-T-Kuhls contain a 100% safe, inert, non-inflammable, non-explosive cooling fluid. This means that they can be installed anywhere without being enclosed in fireproof vaults. The 667 KVA Saf-T-Kuhls shown here are located on the sixth floor. They are used to feed air conditioning and heavy equipment. Ever since 1894 when Kuhlman pioneered in the transformer industry, the emphasis has been on quality workmanship and solid construction. You'll find Kuhlman Transformers serving electrical power and distribution needs throughout America and in foreign countries. The next time you need power, distribution, dry type, or specialty transformers, call the Kuhlman representative in your area. In the meantime, write directly to us for descriptive bulletins.

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